

# Combat®

## Cabinet Heaters

### Installation, Commissioning,

**OIL-FIRED:  
Model MOB  
015 to 0100**

**GAS-FIRED:  
Model MGB  
015 to 0100**



#### FOR YOUR SAFETY

*If you smell gas:*

1. Open windows.
2. **DO NOT** try to light any appliance.
3. **DO NOT** use electrical switches.
4. **DO NOT** use any telephone in your building.
5. Extinguish any open flame.
6. Leave the building.
7. Immediately call your local gas supplier after leaving the building. Follow the gas supplier's instructions.
8. If you cannot reach your gas supplier, call the Fire Department.

#### **WARNING**



#### **Fire Hazard**

Keep all flammable objects, liquids and vapours the minimum required clearances to combustibles away from heater.

Some objects will catch fire or explode when placed close to heater.

Failure to follow these instructions can result in death, injury or property damage.

#### **WARNING**

Improper installation, adjustment, alteration, service or maintenance can result in death, injury or property damage. Read the installation, operation and service manual thoroughly before installing or servicing this equipment.

Installation must be done by a registered installer/contractor qualified in the installation and service of gas/oil-fired heating equipment or your fuel supplier.

#### **Installer**

Please take the time to read and understand these instructions prior to any installation. Installer must give a copy of this manual to the owner.

#### **Owner**

Keep this manual in a safe place in order to provide your service technician with necessary information.



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## Product Approval

ROBERTS GORDON® appliances have been tested and CE certified as complying with the essential requirements of the Gas Appliance Directive, the Low Voltage Directive, the Electromagnetic Compatibility Directive and the Machinery Directive for use with natural gas and LPG when installed, commissioned and maintained in accordance with these instructions.

These instructions refer to gas appliances designed to operate in the European Union.

Appliances designed for other countries (Non-European Union) are available on request.

Oil-fired versions are constructed to the same basic design criteria to burn fuel oil as specified below. Oil-fired appliances must be operated in accordance with local rules and laws.

Oil heaters are supplied as standard for use with Gas Oil, also known as 35-second Oil, Red Diesel, Class D or Class A2. They are also available to order for Kerosine, also known as 28-second Oil or Class C2.

These appliances must be installed in accordance with the local and national codes in force and used only in a sufficiently ventilated space, as specified in these instructions. Before installation, check that the local gas distribution systems, nature of gas and pressure, and adjustment of the appliance are compatible.

## SECTION 1: HEATER SAFETY



Your Safety Is Important to Us!

This symbol is used throughout the manual to notify you of possible fire, electrical or burn hazards. Please pay special attention when reading and

following the warnings in these sections.

Installation, Service and Annual Inspection of heater must be done by a registered installer/contractor qualified in the installation and service of gas/oil-fired heating equipment.

Read this manual carefully before installation, operation, or service of this equipment.

Burner manufacturers manual is also provided to give detailed instructions on the operation of the burner. The settings for use of the burner with the heater are shown in these instructions.

This heater is designed for heating non-residential indoor spaces. Do not install in residential spaces. These instructions, the layout drawing, local codes and ordinances, and applicable standards that apply to gas piping, electrical wiring, venting, etc., must be thoroughly understood before proceeding with the installation.

Protective gear is to be worn during installation, operation and service. Thin sheet metal parts, such as the various venting components, have sharp edges. To prevent injury, the use of work gloves is recommended.

Before installation, check that the local distribution conditions, nature of gas and pressure, and adjustment of the appliance are compatible.

The heater must be applied and operated under the general concepts of reasonable use and installed using best building practices.

This appliance is not intended for use by persons (including children) with reduced physical, sensory or mental capabilities, or lack of experience and knowledge, unless they have been given supervision or instruction concerning use of the appliance by a person responsible for their safety.

Children should be supervised to ensure that they do not play with the appliance.

For additional copies of the Installation, Commissioning, Operation and Service Manual, or relevant EcoFlame burner and gas train manuals, please contact Roberts-Gordon Europe Limited.

### 1.2 Safety Labels and Their Placement

Product safety signs or labels should be replaced by the product user when they are no longer legible.

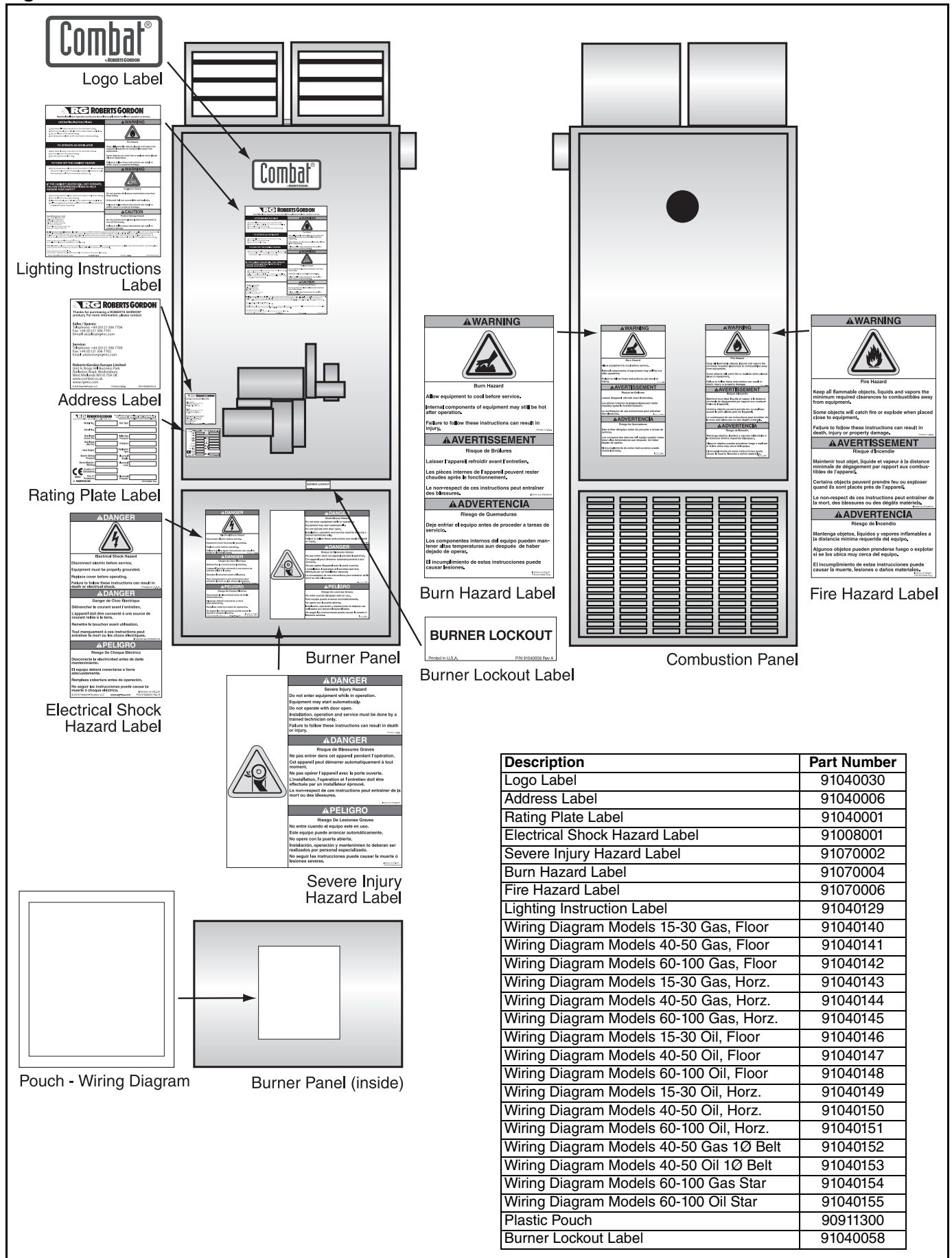
Contact Roberts-Gordon Europe Limited for obtaining replacement signs or labels. See *Page 3, Figure 1*.

### 1.1 Manpower Requirements

To prevent personal injury and damage to the heater, two persons will be required for installation.



Figure 1: Burner and Combustion Panel Label Placement



Description	Part Number
Logo Label	91040030
Address Label	91040006
Rating Plate Label	91040001
Electrical Shock Hazard Label	91008001
Severe Injury Hazard Label	91070002
Burn Hazard Label	91070004
Fire Hazard Label	91070006
Lighting Instruction Label	91040129
Wiring Diagram Models 15-30 Gas, Floor	91040140
Wiring Diagram Models 40-50 Gas, Floor	91040141
Wiring Diagram Models 60-100 Gas, Floor	91040142
Wiring Diagram Models 15-30 Gas, Horz.	91040143
Wiring Diagram Models 40-50 Gas, Horz.	91040144
Wiring Diagram Models 60-100 Gas, Horz.	91040145
Wiring Diagram Models 15-30 Oil, Floor	91040146
Wiring Diagram Models 40-50 Oil, Floor	91040147
Wiring Diagram Models 60-100 Oil, Floor	91040148
Wiring Diagram Models 15-30 Oil, Horz.	91040149
Wiring Diagram Models 40-50 Oil, Horz.	91040150
Wiring Diagram Models 60-100 Oil, Horz.	91040151
Wiring Diagram Models 40-50 Gas 1Ø Belt	91040152
Wiring Diagram Models 40-50 Oil 1Ø Belt	91040153
Wiring Diagram Models 60-100 Gas Star	91040154
Wiring Diagram Models 60-100 Oil Star	91040155
Plastic Pouch	90911300
Burner Lockout Label	91040058

**SECTION 2: INSTALLER RESPONSIBILITY****⚠ WARNING****Explosion Hazard**

**Equipment must have access to uncontaminated air at all times.**

**Failure to follow these instructions can result in death, injury or property damage.**

- To install the heater, as well as the fuel and electrical supplies, in accordance with applicable specifications and codes. Roberts-Gordon Europe Limited recommends the installer contact a local building inspector, Fire Officer or insurance company for guidance.
- To use the information given in this manual together with the local and national codes to perform the installation.
- To install the heater in accordance with the clearances to combustibles of this heater.
- To furnish all needed materials not furnished as standard equipment.
- To plan location of supports, flues and air intakes.
- To provide access to burners for servicing.
- To provide the owner with a copy of this installation, commissioning, operation and service manual.
- To never use heater as support for ladder or other access equipment and never hang or suspend anything from heater.
- To ensure that there is sufficient ventilation in the area to comply with the requirements of all relevant local and national codes.
- To ensure the heater is placed in an approved application.

**2.1 Laminated Wall Plate**

A laminated wall plate is available for the heater as a permanent reminder of the safety instructions and the importance of the required clearances to combustibles. Affix the plate by peeling off the backing of the adhesive strips on the rear surface and position the plate on a wall near the heater (e.g. thermostat or ROBERTS GORDON® Controller).

A copy of the wall plate (P/N 91040095) is illustrated on the back cover. Know your model number and installed configuration. Model number and installed configuration are found on the burner and in the Installation, Commissioning, Operation and Service Manual. Write the largest clearance dimensions with permanent ink according to your model number and configuration in the open spaces on the plate.

**2.2 Corrosive Chemicals****⚠ CAUTION****Product Damage Hazard**

**Do not use heater in area containing corrosive chemicals.**

**Refer to appropriate Material Safety Data Sheets (MSDS).**

**Failure to follow these instructions can result in product damage.**

Roberts-Gordon Europe Limited cannot be responsible for ensuring that all appropriate safety measures are undertaken prior to installation; this is entirely the responsibility of the installer. It is essential that the contractor, the sub-contractor, or the owner identifies the presence of combustible materials, corrosive chemicals or halogenated hydrocarbons\* anywhere in the premises.


*\* **Halogenated Hydrocarbons** are a family of chemical compounds characterized by the presence of halogen elements (fluorine, chlorine, bromine, etc.). These compounds are frequently used in refrigerants, cleaning agents, solvents, etc. If these compounds enter the air supply of the burner, the lifespan of the heater components will be greatly reduced. Warranty will be invalid if the heater is exposed to halogenated hydrocarbons.*

**2.3 National Standards and Applicable Codes**

All appliances must be installed in accordance with the latest revision of applicable standards and local and national codes. This refers also to the electric, gas and venting installation. Note: Additional standards for installations in public garages, aircraft hangars, etc. may be applicable. The main relevant regulations for installation within the UK are:

- Gas safety (installation and use) regulations, 1984 and amendments - 1996.
- BS6230 - Specification for the installation of gas fired forced convection air heaters for commercial and industrial space heating of rated input exceeding 60 kW. (This standard also applies to oil-fired heaters, except for the fuel supply).
- BS6230 - Parts 2 & 3, fire precautions in the design and construction of buildings.
- BS6891 - Low pressure installation pipes.
- BS5410 - Codes of practice for oil firing. Part 2 installation of 44 kW and above output capacity for space heaters, hot water and steam supply purposes.
- Institute of Gas Engineers document IGE/UP/2.
- Building regulations.
- IEE regulations.
- Health and safety at work acts.
- Requirements of local authority, fire officer and insurance company.

## SECTION 3: CRITICAL CONSIDERATIONS

 <b>WARNING</b>

<p style="text-align: center;"><b>Fire Hazard</b></p> <p><b>Keep all flammable objects, liquids and vapours the minimum required clearances to combustibles away from heater.</b></p> <p><b>Some objects will catch fire or explode when placed close to heater.</b></p> <p><b>Failure to follow these instructions can result in death, injury or property damage.</b></p>

**3.1 Basic Information**

Cabinet heaters are supplied with burners suitable for on/off operation as standard. As an option, two-stage (High/Low) operation is available for gas and oil-fired burners.

**3.2 Location and Suspension**

All models:

- Must be installed indoors within the heated space. Special versions are available for installation outdoors.
- Must be installed for floor standing vertical installation.
- Must be installed in a manner which allows all the upper panels and either of the lower side panels to be removed to provide access to all serviceable components.
- Must be placed on a firm, level, non-combustible surface that can support its weight. See *Page 8, Section 4.1* for weight details.
- Special versions supplied with steel channels to support the heater are available and may be mounted horizontally. When installed horizontally, the heater will normally lie on its left side when viewed from the burner. The same clearances and comments on panels must be used, except for the side the heater lies on.

**3.3 Required Clearances to Combustibles**

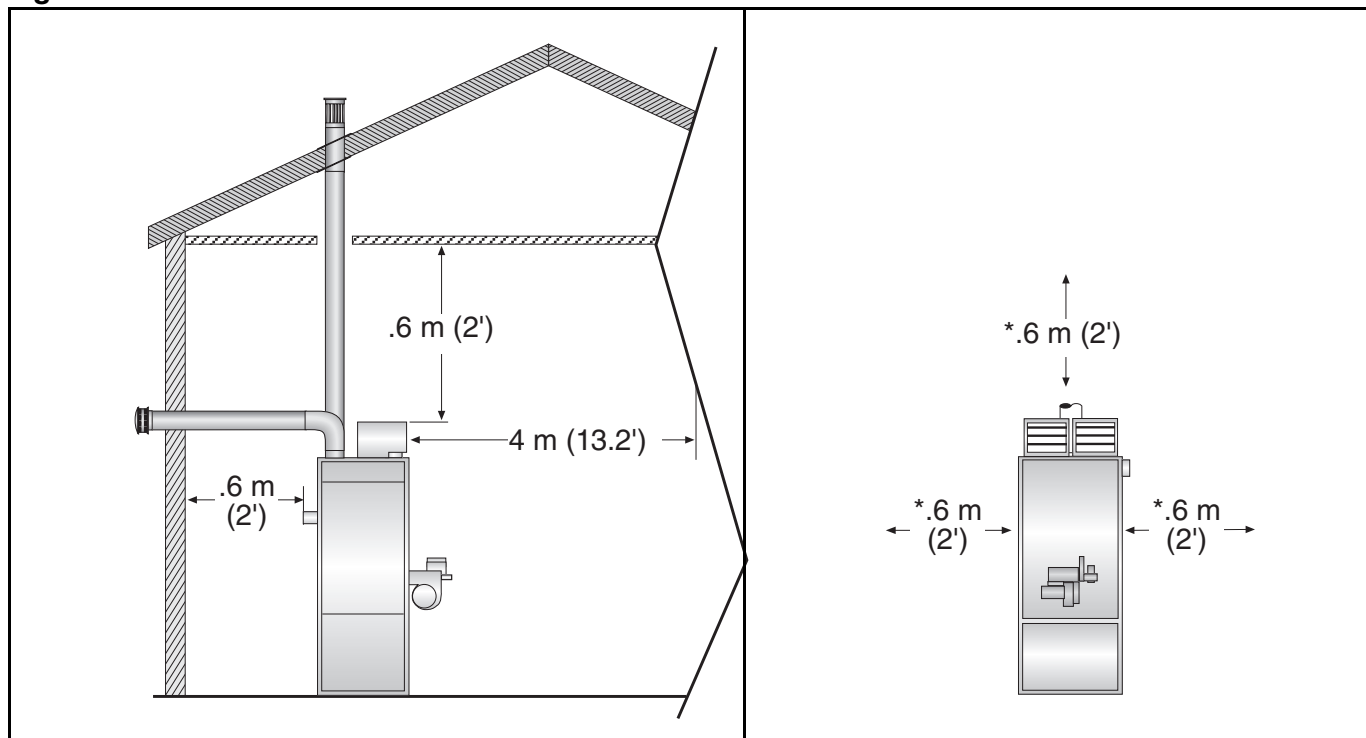
Clearances are the required distances that combustible objects must be away from the heater to prevent fire hazards. Caution should be used when running the system near combustibles. Combustibles are materials, which may catch on fire and include common items such as wood, paper, rubber, fabric, etc. **Maintain clearances to combustibles at all times for safety.**

Clearances around the heater and flue must be as indicated on *Page 6, Figure 2* to ensure access for servicing, and correct operation. If clearances to

combustibles are not indicated, then installation clearances apply.

Check the clearances on each heater for the model heater being installed to make sure the product is suitable for your application and the clearances are maintained. Read and follow the safety guidelines below:

- Keep petrol or other combustible materials including flammable objects, liquids, dust or vapours away from this heater or any other appliance.
- Do not spray aerosols in the vicinity of this appliance.
- The stated clearances to combustibles represents a surface temperature of 50° C (90° F) above room temperature. Building materials with a low heat tolerance (such as plastics, vinyl siding, canvas, tri-ply, etc) may be subject to degradation at lower temperatures. It is the installer's responsibility to assure that adjacent materials are protected from degradation.
- Maintain clearances from heat sensitive equipment and workstations.
- Maintain clearances from vehicles parked below the heater.
- Maintain clearances from swinging and overhead doors, overhead cranes, vehicle lifts, partitions, storage racks, hoists, building construction, etc.
- In locations used for the storage of combustible materials, signs must be posted to specify the maximum permissible stacking height to maintain required clearances from the heater to the combustibles. Signs must be posted adjacent to the heater thermostat. In the absence of a thermostat, signs must be posted in a conspicuous location.
- Consult local Building Inspector, Fire Insurance Carrier or other authorities for approval of proposed installation when there is a possibility of exposure to combustible airborne materials or vapours.
- Hang heater in accordance to minimum suspension requirements. Consult manufacturer.
- Affix the tag on a wall near the heater.

**Figure 2: Installation Clearances and Clearances to Combustibles**

The flue pipe must have clearance from combustibles by 5 cm.

If installed where individuals can come in contact with the pressure relief door or other hot components, adequate guarding must be provided.

All distances are minimum clearance requirements for service access, air flow and safety.

\*A service clearance of 1 m is required on one side to allow for fan replacement.

### 3.4 Ventilation

<b>⚠ WARNING</b>
<b>Carbon Monoxide Hazard</b>
<p>Heaters may be installed vented or unvented.</p> <p><b>Vented heaters must be vented outdoors.</b></p> <p><b>Unvented heaters must be installed in buildings with ventilation rates as per section 7.</b></p> <p><b>Failure to follow these instructions can result in death or injury.</b></p>

It is important to ensure that there is adequate air circulation around the heater to supply air for combustion, ventilation and distribution in accordance with local and national codes.

### 3.5 Fuel Supply

<b>⚠ WARNING</b>
<b>Fire Hazard</b>
<p><b>Connect gas supply according to Figure 14.</b></p> <p><b>Connect oil supply according to Section 8.2.</b></p> <p><b>Do not use gas/oil supply pipe and electrical connections to support the heater's weight.</b></p> <p><b>Gas can leak if not installed properly.</b></p> <p><b>Failure to follow these instructions can result in death, injury or property damage.</b></p>

It is important that the fuel supply pipe is sized correctly to provide the inlet pressure as stated on the heater data plate. The gas/oil supply pipe and electrical connections must not support any of the heater's weight.

### 3.6 Electrical Supply



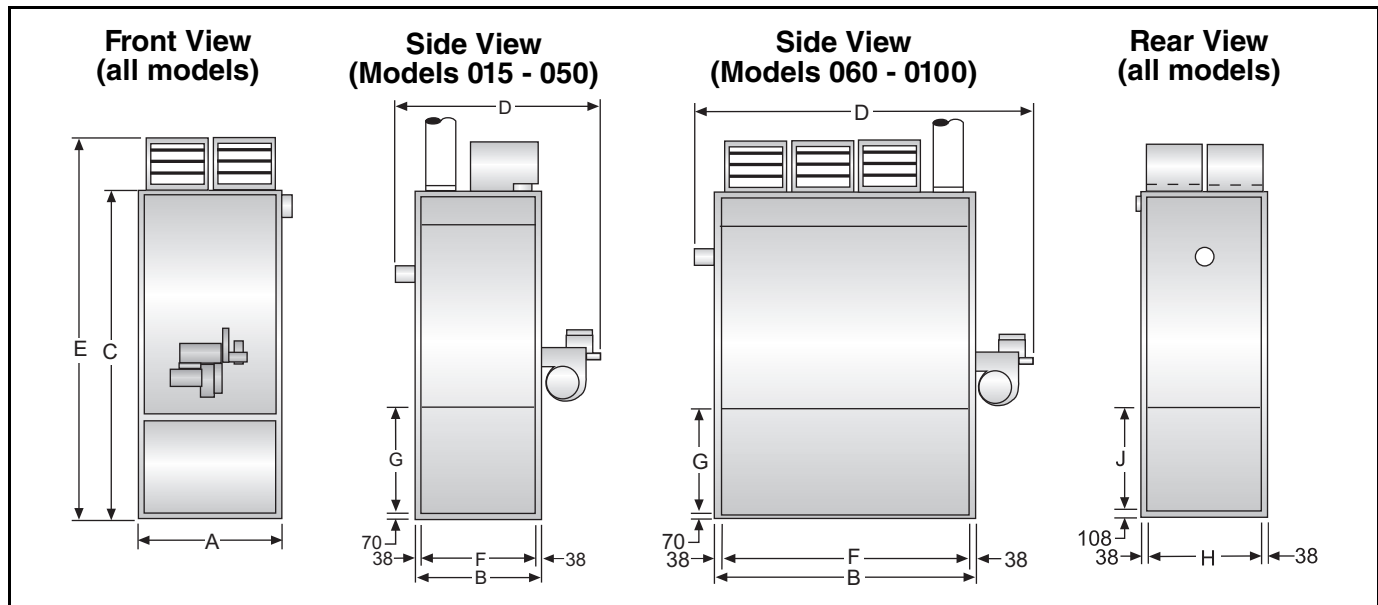
A permanent 230 V, 50 Hz, 1 Ø is required on models 15 to 30 and 400 V, 50 Hz, 3 Ø and neutral required on models 40 to 100 (special version MGB and MOB 040 and 050 models are available as belt drive). The heater also requires suitable energy controls in accordance with *Page 27, Section 9*. ON/OFF control, temperature control, time control, and frost protection are available as a remote control, which needs to be site wired for proper operation of the heater. Alternatively, any remote energy controls may be used which must be wired in accordance with *Page 28, Section 9.3 through Page 39, Section 9.14*.

### 3.7 Flue

Choose heater siting to allow for the proper location of the flue. Each heater must be fitted with an individual and correctly sized sealed flue system. See *Page 17, Section 6*.

No other appliance may be connected to the flue.

For room sealed installation, the air intake must be the same size sealed system and the flue/air intake must terminate at an approved concentric wall or roof terminal.

**SECTION 4: SPECIFICATIONS****4.1 MGB & MOB Internal Heaters****Dimension Data - MGB & MOB Internal Heaters**

		Model	015/020	030	040	050	060/070/080	0100
<b>A</b>	Width	mm (in)	723 28.5	723 28.5	853 33.6	857 33.7	1016 40	1016 40
<b>B</b>	Depth, Cabinet Only	mm (in)	860 33.9	860 33.9	860 33.9	1015 40	1676 66	1994 79
<b>C</b>	Height, Cabinet Only	mm (in)	1778 70	1778 70	1956 77	1956 77	1956 77	1956 77
<b>D</b>	Depth, Overall	mm (in)	1267 50	1267 50	1337 53	1496 59	2156 85	2496 98
<b>E</b>	Height, Including Heads	mm (in)	2007 79	2083 82	2261 89	2261 89	2261 89	2261 89
<b>F</b>	Left/Right Air Inlet Spigot - Depth	mm (in)	781 31	781 31	781 31	940 37	1600 63	1918 76
<b>G</b>	Left/Right Air Inlet Spigot - Height	mm (in)	457 18	457 18	560 22	560 22	560 22	559 22
<b>H</b>	Rear Air Inlet Spigot - Depth	mm (in)	648 26	648 26	781 31	781 31	NA	NA
<b>J</b>	Rear Air Inlet Spigot - Height	mm (in)	361 14	361 14	446 18	446 18	NA	NA
	Flue Diameter*	mm (in)	100 4	130 5	130 5	130 5	229 9	229 9
	Flue Length**	m (ft)	8 27	8 27	8 27	8 27	NA	NA
	Weight	kg (lbs)	200 441	200 441	245 541	270 596	440 970	530 1170

**NOTES:** Horizontal cabinet heaters are designed to lie on their left side as standard.

For vertical models, add 54 mm (2 in) to the right side of the cabinet for the fan/limit thermostat.

For horizontal models, add 54 mm (2 in) to the top of the cabinet for the fan/limit thermostat.

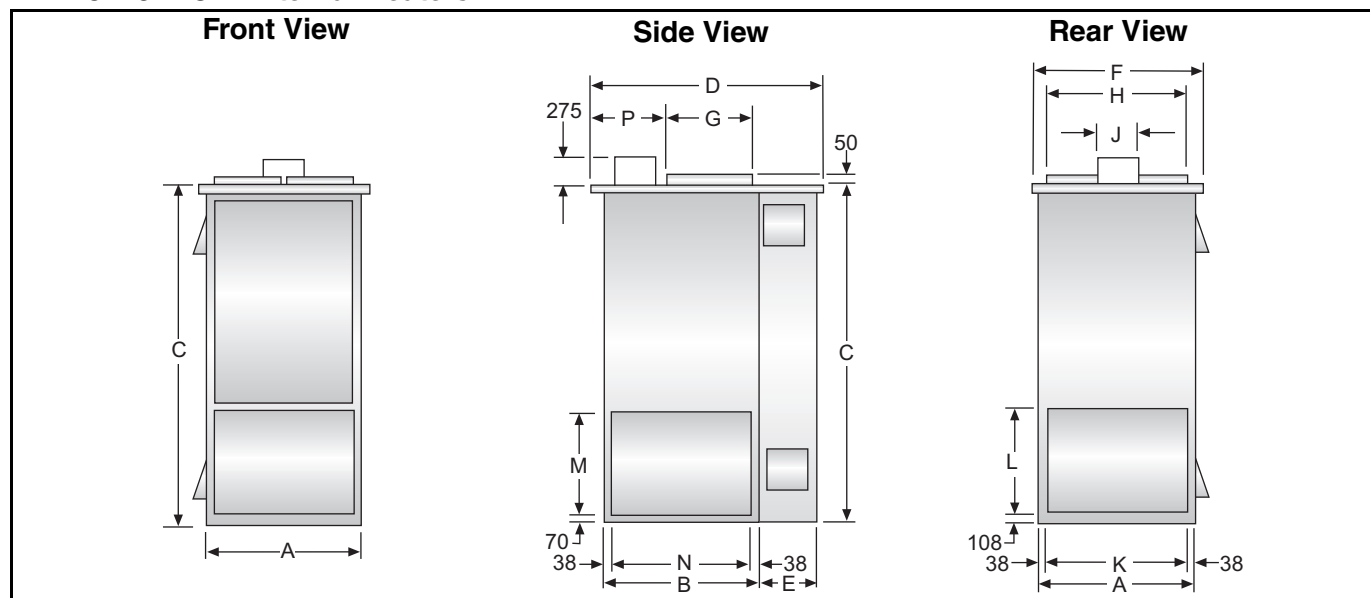
\*All MOB heaters must be connected to a suitable flue constructed of single wall stainless steel.

\*MGB 15-50 heaters must be connected to a suitable flue constructed of single wall aluminium or stainless steel.

\*\* Maximum flue length between heater and flue terminal (horizontal only).



## 4.2 MGB &amp; MOB External Heaters



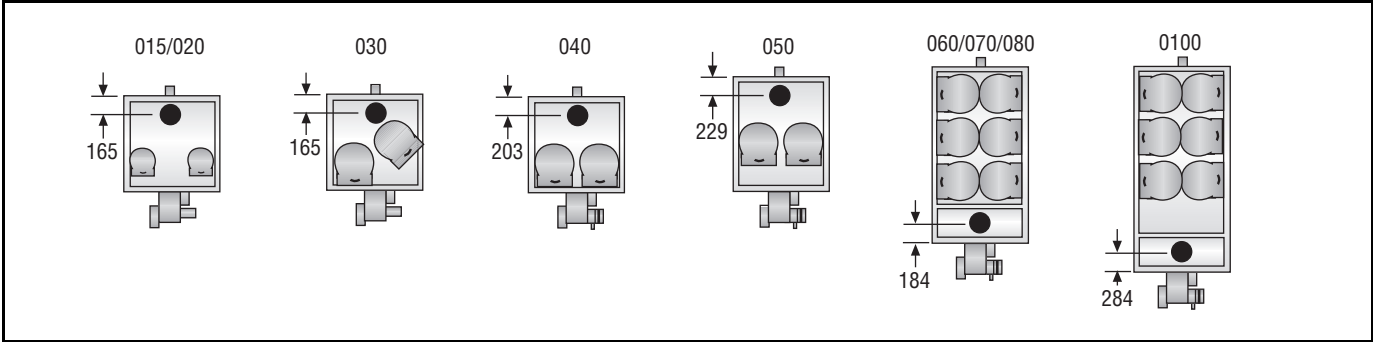
Dimension Data - MGB &amp; MOB External Heaters

		Model	015/020/030	040	050	060/070/080	0100
<b>A</b>	Width	mm (in)	723 28.5	853 33.6	857 33.7	1016 40	1016 40
<b>B</b>	Depth, Cabinet Only	mm (in)	860 33.9	860 33.9	1015 40	1676 66	1994 79
<b>C</b>	Height, Cabinet Only	mm (in)	1778 70	1956 77	1956 77	1956 77	1956 77
<b>D</b>	Depth Overall	mm (in)	1396 55	1498 59	1657 65	2483 98	2800 110
<b>E</b>	External Heater Housing	mm (in)	373 15	474 19	474 19	639 25	639 25
<b>F</b>	Width Overall	mm (in)	840 33	973 38	973 38	1132 45	1132 45
<b>G</b>	Air Outlet Spigot - Depth	mm (in)	476 19	476 19	610 24	1238 49	1524 60
<b>H</b>	Air Outlet Spigot - Width	mm (in)	648 26	781 31	781 31	940 37	940 37
<b>J</b>	Flue Diameter	mm (in)	178 7	178 7	178 7	229 9	229 9
<b>K</b>	Rear Return/Fresh Air Inlet - Width	mm (in)	648 26	781 31	781 31	NA	NA
<b>L</b>	Rear Return/Fresh Air Inlet - Height	mm (in)	178 7	178 7	178 7	229 9	229 9
<b>M</b>	Left/Right Return Fresh Air Inlet - Height	mm (in)	457 18	560 22	560 22	560 22	560 22
<b>N</b>	Left/Right Return Fresh Air Inlet - Width	mm (in)	781 31	781 31	940 37	1600 63	1918 76
<b>P</b>	Rear of Heater to Air Outlet Spigot*	mm (in)	401 16	401 16	426 17	96 4	96 4

**NOTE:** \*For Models 060-0100, the circular flue spigot is at the front of the heater, with the rectangular air outlet spigot at the rear. COMBAT® external cabinet heaters are designed to be sited externally, with heat ducted into the building. These models are fitted with a special metal rain drip cover, and all cabinet joints are silicone sealed to ensure that the heaters are weatherproof.

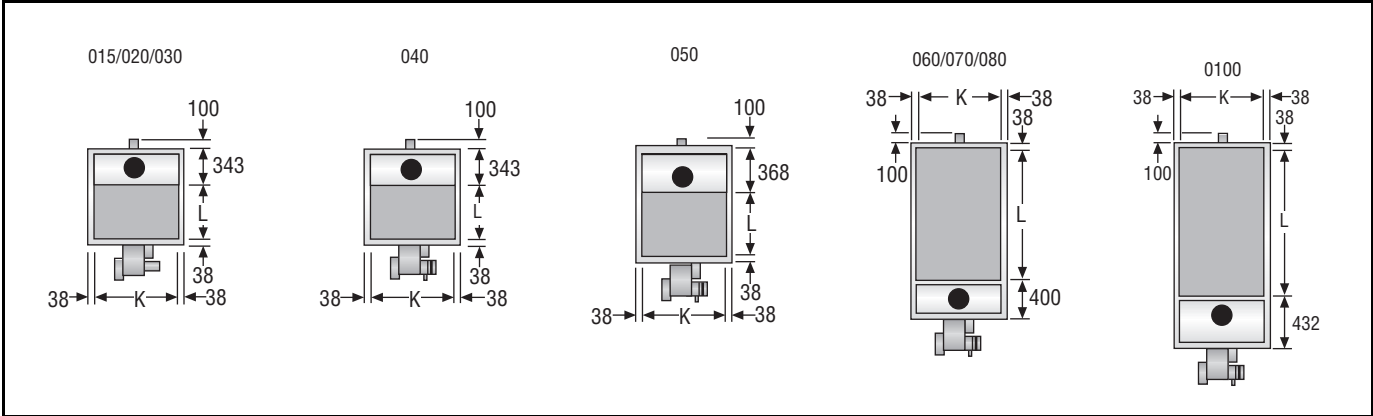
4.3 Air Outlet and Flue Arrangements

4.3.1 Vertical and Horizontal Heaters - Free Blowing (top view)



**NOTE:** Models 015-020 are fitted with 229 mm (9") diameter discharge heads as standard.  
Models 030-0100 are fitted with 356 mm (14") diameter discharge heads as standard.

4.3.2 Vertical and Horizontal Heaters - Air Outlet Spigots (top view)



Outlet Spigot Dimensions

		Model	015/020/030	040	050	060/070/080	0100
K	Spigot width	mm (in)	648 (26)	781 (31)	781 (31)	940 (37)	940 (37)
L	Spigot Depth	mm (in)	476 (19)	476 (19)	610 (24)	1238 (49)	1524 (60)



#### 4.4 General Technical Data Table (all models)

Appliance Category II <sup>2H/L 3B/P</sup>

Model		015	020	030	040	050	060	070	080	0100
Electrical Supply*		230 V / 50 Hz / 1 Ø				400 V / 50 Hz / 3 Ø				
Main Fan Motor Type		Direct Drive				Belt Drive				
Motor Size	(kW)	0.75				2.2	1.5	2.2		4.0
Motor Pulley	(PCD)	NA					2 A x 80 mm	2 A x 95 mm		2 A x 106 mm
Fan Pulley	(PCD)	NA					2 A x 180 mm	2 A x 180 mm	2 A x 180 mm	2 A x 180 mm
Start Current	(Amps)	24	24	28	21	21	10.2	30	30	35
Run Current	(Amps)	5.3	5.3	6.3	6.2	6.2	3.5	5.1	5.1	9.6
Airflow	(m³/h)	3398	3398	5097	6796	8495	11044	12443	12443	17330
Free Blowing	(ft³/min)	2000	2000	3000	4000	5000	6500	7500	7500	10200

**NOTE:** \*Models 40 & 50 are available with 230 V 1 Ø electrical supply as an extra cost option.

A permanent uninterrupted electrical supply is required for all models.

When reading the following data tables, ensure that you are using the correct table for the burner and gas valve installed. The data tables include a burner reference letter that can be found on the heater data plate. Refer to the burner manufacturer's instructions and the specific instructions supplement where applicable. The burner settings shown in the instructions must be used for burner settings.

#### 4.5 Technical Data - Ecoflam ON/OFF Burners

Model		015	020	030	040	050	060	070	080	0100
Gross Heat Input	(kW) (Btu/h) x (1000)	55.5 189.4	73.3 250.1	93.2 318.0	129.9 443.2	162.0 552.7	208.0 709.7	242.0 825.7	275.2 939.0	348.5 1189.1
Net Heat Input	(kW) (Btu/h) x (1000)	50.0 170.6	66.0 225.2	84.0 286.6	117.0 399.2	146.0 498.2	187.4 639.4	218.0 743.8	248.0 846.2	314.0 1071.4
Heat Output	(kW) (Btu/h) x (1000)	47.4 161.7	61.2 208.8	77.1 263.0	107.4 366.5	134.5 458.9	171.5 585.2	200.8 685.1	230.4 786.1	289.5 987.8
Pressure Switch Setting	(mbar)	4.8								
Gas Connection	(in)	1/2	3/4				1		1 1/4	
Natural Gas (G20) Data - Inlet Pressure 20 mbar (7.8 in WG) Min 17 mbar (6.8 in WG) Max 25 mbar (10 in WG)										
Main Burner Gas Pressure	mbar	5.5	4.8	7	8.3	8.3	8	8.5	8.8	10.0
Gas Rate	(m³/h) (ft³/h)	5.3 187	7.0 247	8.9 314	12.4 438	15.4 546	19.8 701	23.1 816	26.2 928	33.2 1175
Burner Type		Max Gas 70	Max Gas 105	Max Gas 105	Max Gas 170	Max Gas 170	Max Gas 250	Max Gas 250	Max Gas 350	Max Gas 350
Burner Head		TL	TC	TC	TC	TC	TC	TC	TC/TL	TC/TL
Burner Head Setting	(mm)	1.5	1.5	2.8	0.8	2	3.5	5	1	1.5
Air Setting	Air Damper Position	3	3	14	5	5	4.5	5	2.3	4
Valve Type Main Gas		MB-DLE 403	MB-DLE 405		MB-ZRDLE 407		MB-ZRDLE 410		MB-ZRDLE 412	
LPG Gas Propane (G31) Data - Inlet Pressure 37 mbar (14.6 in WG) Min 25 mbar (10 in WG) Max 45 mbar (18 in WG)										
Main Burner Gas Pressure	mbar	5.4	3.9	4.8	9.4	8.3	8.5	8.4	7.3	10.1
Gas Rate	(m³/h) (kg/h)	2.1 3.9	2.8 5.2	3.5 6.5	4.9 9.1	6.1 11.3	7.8 14.4	9.1 16.9	10.4 19.3	13.1 24.3
Main Gas Orifice	(mm dia)	8.5	10.0	10.0	14.5	14.5	14.5	14.5	14.5	
Burner Type		Max Gas 70	Max Gas 105		Max Gas 170		Max Gas 250		Max Gas 350	
Burner Head		TL	TC	TC	TC	TC	TC	TC	TC/TL	TC/TL
Burner Head Setting	(mm)	1	1	2	0	1.8	2.8	4.2	1	1.5
Air Setting	Air Damper Position	3	3	14	5	5	4.5	5	2.3	4
Valve Type Main Gas		MB-DLE 403	MB-DLE 405		MB-ZRDLE 407		MB-ZRDLE 410		MB-ZRDLE 412	

**NOTE:** For adjustment of head setting, see Ecoflam Instructions.

## 4.6 Technical Data - Ecoflam 2-Stage Burners

Model		020	030	040	050	060	070	080	0100
Maximum Gross Heat Input	(kW) (Btu/h) x (1000)	73.3 250.1	93.2 318.0	129.9 443.2	162.0 552.7	208.0 709.7	242.0 825.7	275.2 939.0	348.5 1189.1
Maximum Net Heat Input	(kW) (Btu/h) x (1000)	66.0 225.2	84.0 286.6	117.0 399.2	146.0 498.2	187.4 639.4	218.0 743.8	248.0 846.2	314.0 1071.4
Minimum Gross Heat Input	(kW) (Btu/h) x (1000)	51.3 175.0	65.2 222.5	90.9 310.2	113.4 386.9	145.6 496.8	169.4 578.0	192.6 657.2	244.0 832.5
Minimum Net Heat Input	(kW) (Btu/h) x (1000)	46.2 157.6	58.8 200.6	81.9 279.5	102.2 348.7	131.2 447.7	152.6 520.7	173.6 592.3	219.8 750.0
Maximum Heat Output	(kW) (Btu/h) x (1000)	61.2 208.8	77.1 263.0	107.4 366.5	134.5 458.9	171.5 585.2	200.8 685.1	230.4 786.1	289.5 987.8
Minimum Heat Output	(kW) (Btu/h) x (1000)	43 147	55 188	77 263	94 321	124 423	144 491	161 549	205 699
Pressure Switch Setting	(mbar)	4.8							
Gas Connection	(in)	1/2		3/4"		1		1 1/4	
Natural Gas (G20) Data - Inlet Pressure 20 mbar (7.8 in WG) Min 17 mbar (6.8 in WG) Max 25 mbar (10 in WG)									
Main Burner Gas Pressure	(mbar)	5.4	6.8	8.6	9	8.5	12.5	8	10.2
Min. Burner Gas Pressure	(mbar)	3.3	2.8	3.5	4	4.8	7.5	4.5	5.6
Maximum Gas Rate	(m³/h) (ft³/h)	7.0 247	8.9 314	12.4 438	15.4 544	19.8 699	23.1 816	26.2 925	33.2 1172
Minimum Gas Rate	(m³/h) (ft³/h)	5.4 190.7	5.6 197.8	7.5 264.9	9.6 339.0	14.8 522.7	17.9 632.1	20.2 713.4	25.2 889.9
Burner Type		Max Gas 120		Max Gas 170		Max Gas 250		Max Gas 350	
Burner Head		TC	TC	TC	TC	TL	TL	TC/TL	TC/TL
Burner Head Setting	(number)	1	1	1	1.5	3.2	5	1	1.5 / 1.8
Low Flame Air Orange Cam	**	30°		1	1.5	1.8	1.9	1.7	1.5
High Flame Air Red Cam	**	36°	73°	2.5	5	5	4	2.2	1.8
Valve Type Main Gas		MB-ZRDLE 405		MB-ZRDLE 407		MB-ZRDLE 410		MB-ZRDLE 412	
LPG Gas Propane (G31) Data - Inlet Pressure 37 mbar (14.6 in WG) Min 25 mbar (10 in WG) Max 45 mbar (18 in WG)									
Main Burner Gas Pressure	(mbar)	2.7	4.4	9.3	8.4	8.4	8.3	8	10.1
Min. Burner Gas Pressure	(mbar)	1.9	1.3	4.8	3.9	3.9	4.8	7.4	5.3
Maximum Gas Rate	(m³/h) (kg/h)	2.8 5.1	3.5 6.5	4.9 9.1	6.1 11.3	7.8 14.5	9.1 16.9	10.4 19.2	13.1 24.3
Minimum Gas Rate	(m³/h) (kg/h)	1.9 3.5	1.9 3.5	3.3 6.1	4.1 7.6	6.2 11.4	6.6 12.2	6.5 12.0	10.2 19.0
Main Gas Orifice	(mm dia)	10.0		14.5					NA
Burner Type		Max Gas 120		Max Gas 170		Max Gas 250		Max Gas 350	
Burner Head		TC	TC	TC	TC	TL	TL	TC/TL	TC/TL
Burner Head Setting	(mm)	1	1	0	1.7	2.7	4.2	1	1.5
Low Flame Air Orange Cam	**	30°	25°	1	1.5	1.9	1.9	1.5	2
High Flame Air Red Cam	**	35°	55°	3	5	5	5	2.1	5
Valve Type Main Gas		MB-ZRDLE 405		MB-ZRDLE 407		MB-ZRDLE 410		MB-ZRDLE 412	

**NOTE:** The air setting is a guide only. The final setting is subject to combustion testing.

When setting the minimum firing rate, a check must be made following the setting of the burner combustion. The check is made by running the heater on low fire for a minimum of 15 minutes at the full transport air rate and at typical ambient conditions. During the test, check that the flue gas temperature does not fall below 125° C (257° F). Should the flue gas temperature fall below 100° C (212° F), then the low fire gas setting must be increased to a value that will achieve 125° C (257° F) flue gas temperature; otherwise condensation may form in the heat exchanger and flue, causing rapid corrosion and short operational life.

**NOTE:** For adjustment of head setting, see Ecoflam Instructions.

## 4.7 Technical Data - Ecoflam Oil-Fired Burners

Model		015	020	030	040	050	060	070	080	0100
Gross Heat Input	(kW) (Btu/h) x (1000)	55.5 189.4	73.3 250.1	93.2 318.0	129.9 443.2	162.0 552.7	208.0 709.7	242.0 825.7	275.2 939.0	348.5 1189.1
Heat Output	(kW) (Btu/h) x (1000)	47.4 161.8	61.2 208.9	78.4 267.4	110.2 375.9	134.5 458.8	177.7 606.5	205.3 700.3	230.4 786.2	293.4 1001.0
Burner Type		MAX 8	MAX 8	MAX 12	MAX 15	MAX 15	MAX 20	MAX 20	MAX 30	MAX 35
Oil Pump Connections	(in)	3/8								
Light Fuel Oil (Gas Oil) Data										
Nozzle Size	*US (gal/h)	1.1	1.35	1.75	2.25	3	4.5	5	5.5	2.5
Angle & Type		60°H				60°B		60°S	60°B	60°B
Make		Danfoss								
Head Setting	(number)	0	1	0.5	0	0	1.5	1.5	1.5	1.5
Air Setting	(number)	.45 (1/2)	1.4	4	2	2.5	2.3	3	4.5	3
Burner Fuel Pressure	(Bar) (lbf/in²)	10.6 154	13 189	12.5 181	15.5 225	14 203	11 160	10.3 149	10.3 149	12 174
Fuel Consumption	(L/h) *UK (gal/h)	5.3 1.17	7.0 1.55	8.9 1.96	12.4 2.73	15.6 3.43	20.0 4.4	23.2 5.1	26.4 5.8	30.56 6.72
Maximum Oil Pressure to Pump Inlet	(Bar) (lbf/in²)	2 2.9								
Kerosene Data										
Nozzle Size	*US (gal/h)	1.25	1.65	2.25	3	3.5	5	5.5	6	5.5
Angle & Type		60°EH				60°B		60°ES	60°B	60°B
Make		Danfoss								
Head Setting	(number)	0	1	0.5	0	0	1.5	1.5	1.5	1.5
Air Setting	(number)	.45 (1/2)	1.4	4	2	2.5	2.3	3	4.5	3
Burner Fuel Pressure	(Bar) (lbf/in²)	8.6 125	9 131	8.1 117	9.5 138	7 / 10 102 / 145	9.5 138	8.5 123	9.5 138	8.5 123
Fuel Consumption	(L/h) *UK (gal/h)	5.5 1.2	7.2 1.6	9.2 2.0	12.8 2.8	16.1 3.5	20.6 4.5	23.9 5.3	27.2 6.0	31.5 6.9

**NOTE:** For adjustment of head setting, see Ecoflam Instructions.

\* Nozzle sizes are quoted in US gal/h. Fuel consumption is quoted in imperial gal/h.

## 4.8 Technical Data - Ecoflam 2-Stage Oil Burners

Model		030	040	050	060	070	080	0100
Maximum Gross Heat Input	(kW) (Btu/h) x (1000)	93.2 318.0	129.9 443.2	162.0 552.7	208.0 709.7	242.0 825.7	275.2 939.0	348.5 1189.1
Maximum Net Heat Input	(kW) (Btu/h) x (1000)	84.0 286.6	117.0 399.2	146.0 498.2	187.4 639.4	218.0 743.8	248.0 846.2	314.0 1071.4
Minimum Gross Heat Input	(kW) (Btu/h) x (1000)	65.2 222.5	90.9 310.2	113.4 386.9	145.6 496.8	169.4 578.0	192.6 657.2	244.0 832.5
Minimum Net Heat Input	(kW) (Btu/h) x (1000)	58.8 200.6	81.9 279.5	102.2 348.7	131.2 447.7	152.6 520.7	173.6 592.3	219.8 750.0
Maximum Heat Output	(kW) (Btu/h) x (1000)	77.1 263.0	107.4 366.5	134.5 458.9	171.5 585.2	200.8 685.1	230.4 786.1	289.5 987.8
Minimum Heat Output	(kW) (Btu/h) x (1000)	55 188	77 263	94 321	124 423	144 491	161 549	205 699
Light Fuel Oil (Gas Oil) Data								
Burner Type		MAX 12	MAX 15	MAX 15	MAX 25	MAX 25	MAX 25	MAX 35
Oil Pump Connection		3/8						
Nozzle Size	US (gal/h)	1.5	2.25	3	2.75 / 1.5	3.00 / 2.00	3.50 / 2.00	4.50 / 2.50
Angle & Type		60° H		60° B	60° B / 60° H	60° B	60° B	60° B
Make		Danfoss						
Head Setting	number	0.5	0	0	1	1.5	3.5	1.5
Low Air Setting	number	3.8	1.5	1.9	1.6	2.1	1.8	1.5
High Air Setting	number	2	2	2.5	2.5	4.5	5	3
Burner Fuel Pressure	Bar	16 / 10	7 / 15.5	15 / 8	11	11	12	12
	lbf/in^2	232.1 / 145.0	101.5 / 224.8	217.6 / 116.0	159.5	159.5	174.0	174.0
Low Fuel Consumption	L/h	7	8.5	12.9	12.7	14.3	17	21.1
	UK (gal/h)	1.5	1.9	2.8	2.8	3.1	3.7	4.6
High Fuel Consumption	L/h	8.9	12.4	15.6	20	23.3	26.4	33.5
	UK (gal/h)	2.0	2.7	3.4	4.4	5.1	5.8	7.4
Maximum Pressure to Pump inlet	Bar	2						
	lbf/in^2	2.9						
Kerosene Data								
Nozzle Size	*US (gal/h)	1.75	3.00	3.50	3.00 / 2.00	3.50 / 2.50	4.00 / 2.50	5.50 / 3.00
Angle & Type		60°EH			60°B			
Make		Danfoss						
Head Setting	(number)	0.5	0	0	1	1.5	3.5	1.5
Low Air Setting	(number)	3.8	1.5	1.9	1.6	2.1	1.8	1.5
High Air Setting	(number)	2	2	2.5	2.5	4.5	5	3
Burner Fuel Pressure	(Bar) (lbf/in²)	7 / 12 101.5 / 174.0	7 / 9.5 101.5 / 137.8	10 145.0	9.5 137.8	8.5 123.3	10 145.0	8.5 123.3
	(L/h) *UK (gal/h)	5.5 1.2	7.2 1.6	9.2 2.0	12.8 2.8	16.1 3.5	20.6 4.5	23.9 5.3
High Fuel Consumption	(L/h) *UK (gal/h)	9.2 2.0	12.8 2.8	16.1 3.5	20.6 4.5	24.0 5.3	27.2 6.0	34.5 7.6

## SECTION 5: HEATER INSTALLATION

⚠ WARNING			
			
<b>Crush Hazard</b> Use proper lifting equipment and practices.	<b>Falling Hazard</b> Use proper safety equipment and practices to avoid falling.	<b>Severe Injury Hazard</b> Use proper lifting practices and equipment.  Equipment and accessories are heavy.	<b>Cut/Pinch Hazard</b> Wear protective gear during installation, operation and service.  Edges are sharp.
Failure to follow these instructions can result in death, injury or property damage.			

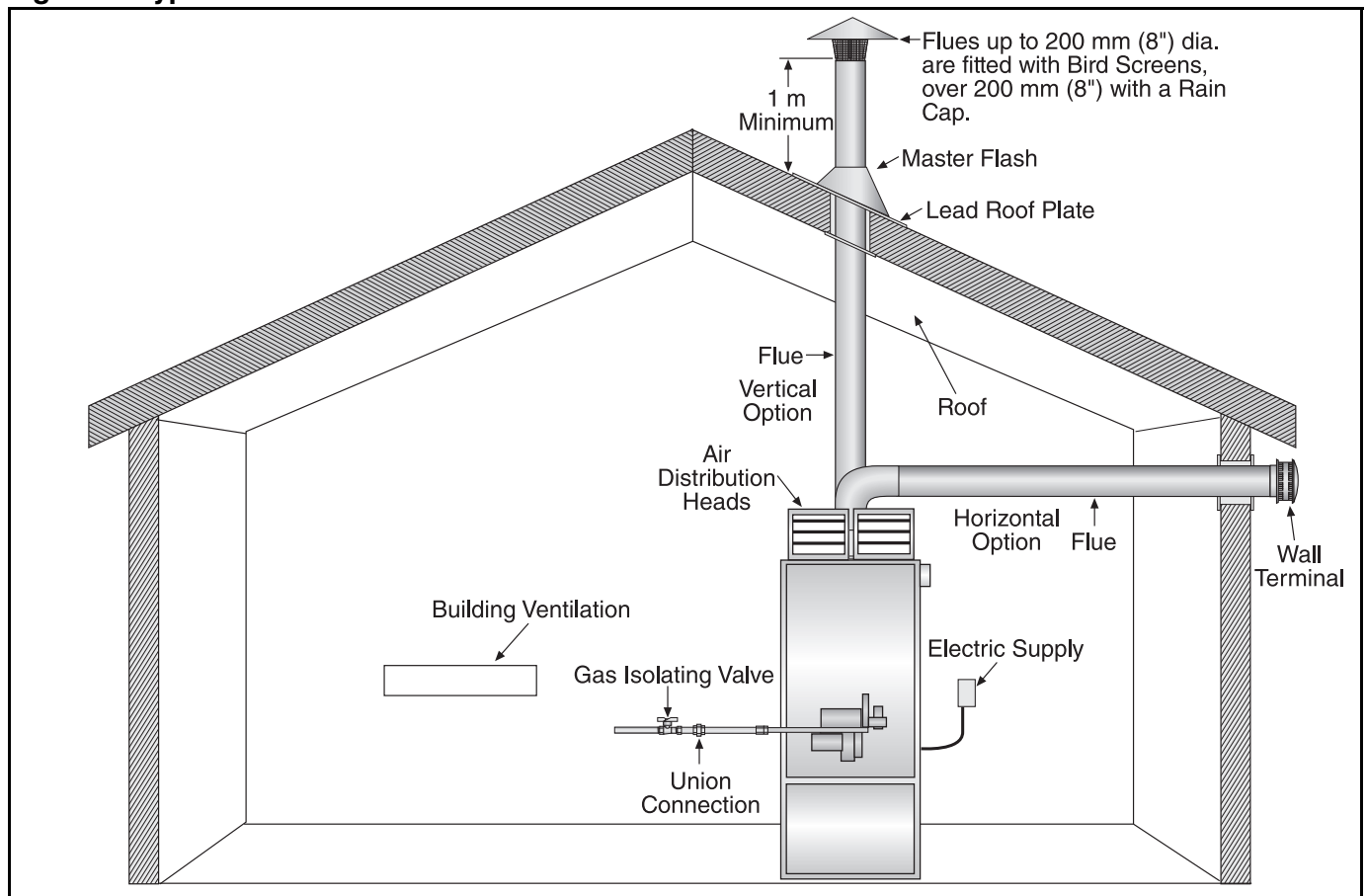
**5.1 General**

Heaters are designed for floor standing vertical installation. Special versions supplied with steel channels to support the heater are available and may be mounted horizontally. When installed horizontally, the heater will normally lie on its left side when viewed from the burner. The heater

should be placed on a firm, level, non-combustible surface that can support its weight. See *Page 8, Section 4.1* for weight details.

**5.2 Handling**

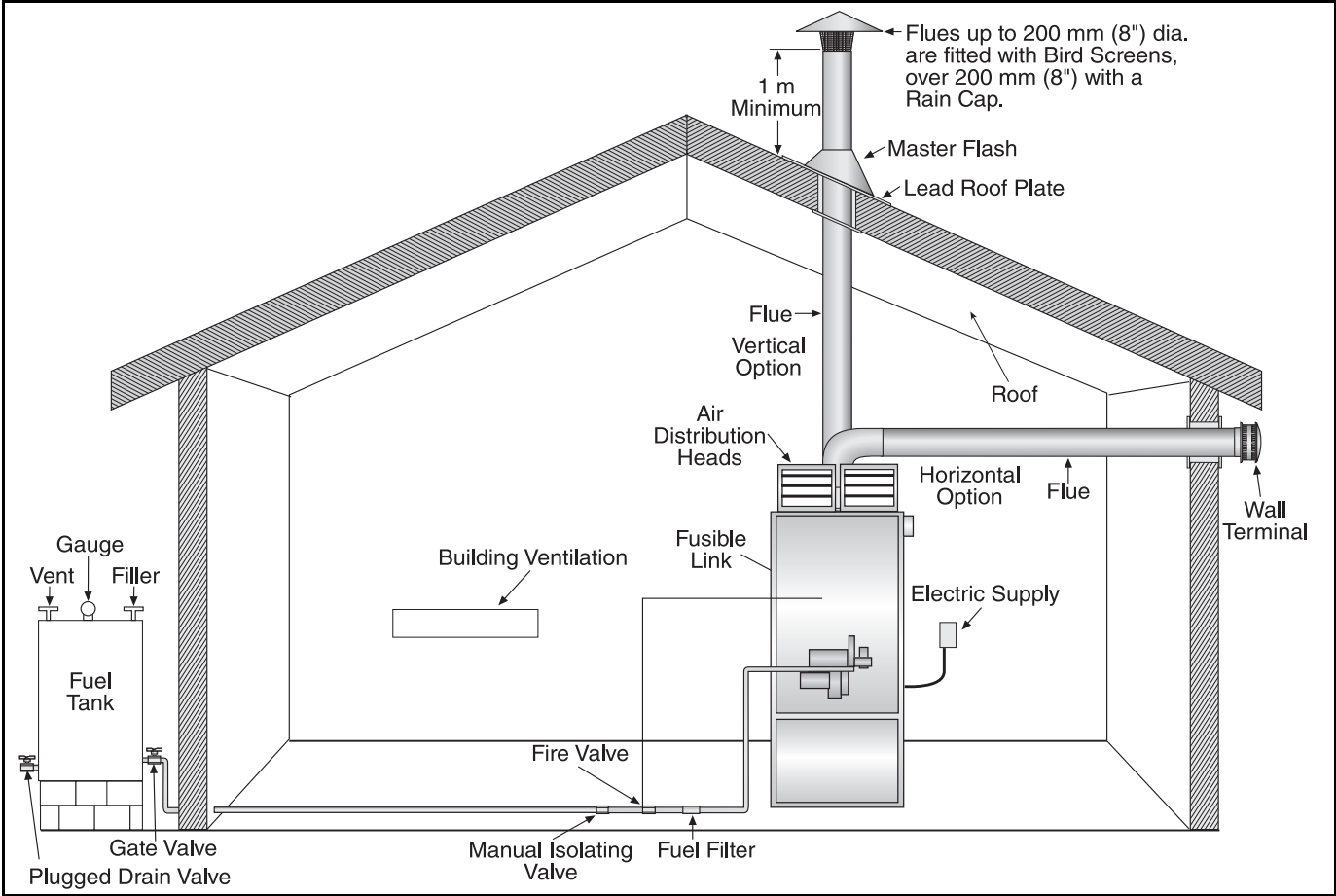
All cabinet heaters are supplied with an integral pallet and shrink wrapped. Remove pallet before installing the heater.

**Figure 3: Typical Installation of an Gas-Fired Cabinet Heater**

\*100 mm (4") and 150 mm (6") flue use stainless steel or aluminium flue pipe.

\*\* 229 (9") mm flue use stainless steel single wall flue pipe only.

Figure 4: Typical Installation of an Oil-Fired Cabinet Heater



\*Only single wall stainless steel flue is to be used on oil-fired cabinet heaters.

## SECTION 6: FLUE INSTALLATION

## 6.1 Flue Installation

**! WARNING****Carbon Monoxide Hazard**

**Heater must be vented.**

**Heater must be installed according to the installation manual.**

**Failure to follow these instructions can result in death or injury.**

**! WARNING****Fire Hazard**

**Keep all flammable objects, liquids and vapours the minimum required clearances to combustibles away from heater.**

**Some objects will catch fire or explode when placed close to heater.**

**Failure to follow these instructions can result in death, injury or property damage.**

**! WARNING****Cut/Pinch Hazard**

**Wear protective gear during installation, operation and service.**

**Edges are sharp.**

**Failure to follow these instructions can result in injury.**

The flue must terminate outside of the building. Flues and air intakes must be a fully sealed system and correctly sized for the model. See Page 8, Section 4.1. Flues should be assembled as on Page

18, Figure 5 through Page 21, Figure 13. The joints between the flue and the roof or wall must be properly sealed. If the flue passes through a wall or ceiling of combustible material it must be enclosed by a sleeve of non-combustible material and be separated from the sleeve by at least a 25 mm (1") air gap.

For double walled flue pipe conforming to BS 715, the 25 mm (1") separation distance should be measured from the outside surface of the inner liner. For double wall flue pipe conforming to BS 4543-2 and 3, the external skin and air gap constitutes insulation to a standard where no extra clearances to combustibles material is required other than normal installation tolerances.

**Flues must be adequately supported so that the heater does not bear the weight of the flue.**

For straight and offset flue termination, See Page 18, Figure 5 and Figure 6.

**Horizontal Flue Installation**

Horizontal flue should be fitted ensuring a slight gradient approximately 2° towards the terminal. Where condensation is likely, traps should be included to encourage the condensate to flow freely to a point from which it may be released, preferably into a gully. Condensate must not be allowed to drain back into the heater as this could result in corrosion and damage.

The condensate pipe from the flue to the disposal point must be made from corrosion resistant pipe of not less than 25 mm (1") internal diameter.

**90° bends and horizontal pipe must not be used in flues except for the immediate connection to a room-sealed heater [1 m (3.5') max].** 135° bends are used to offset the flue as on Page 18, Figure 6. If condensation is likely to occur in the flue, then provision should be made for drainage.

When designing the flue system, the prevention of the formation and entrapment of condensation must be a key consideration.

**Only single wall stainless steel flue is to be used on oil-fired cabinet heaters.**

Figure 5: Flue Termination

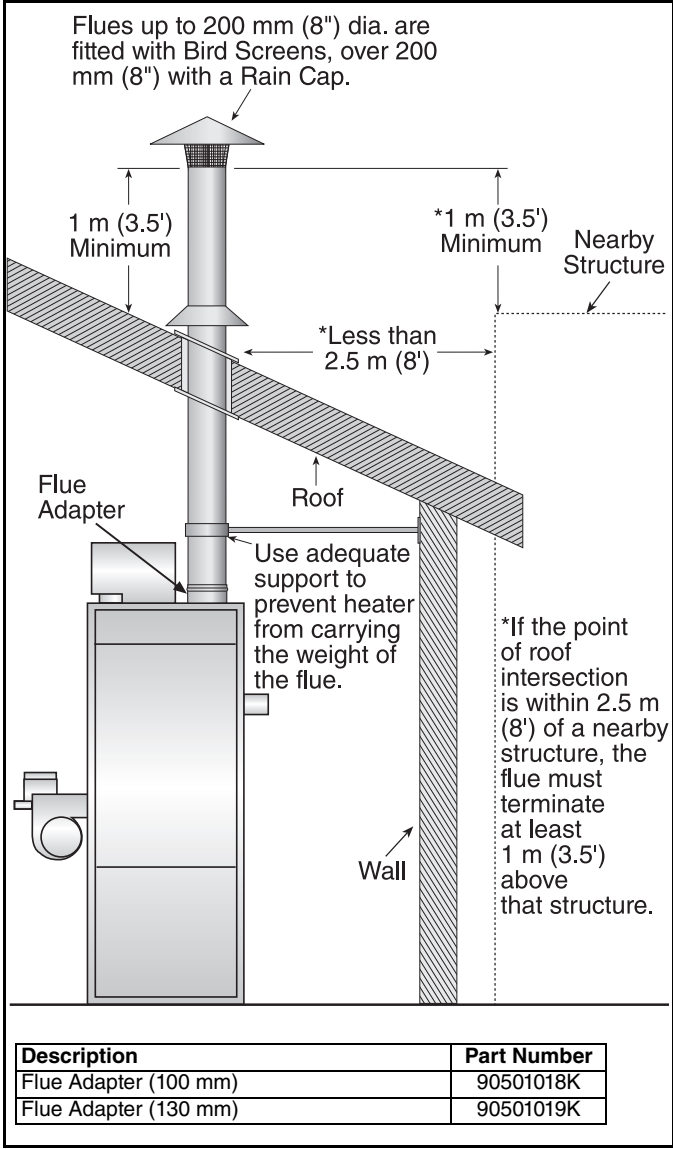
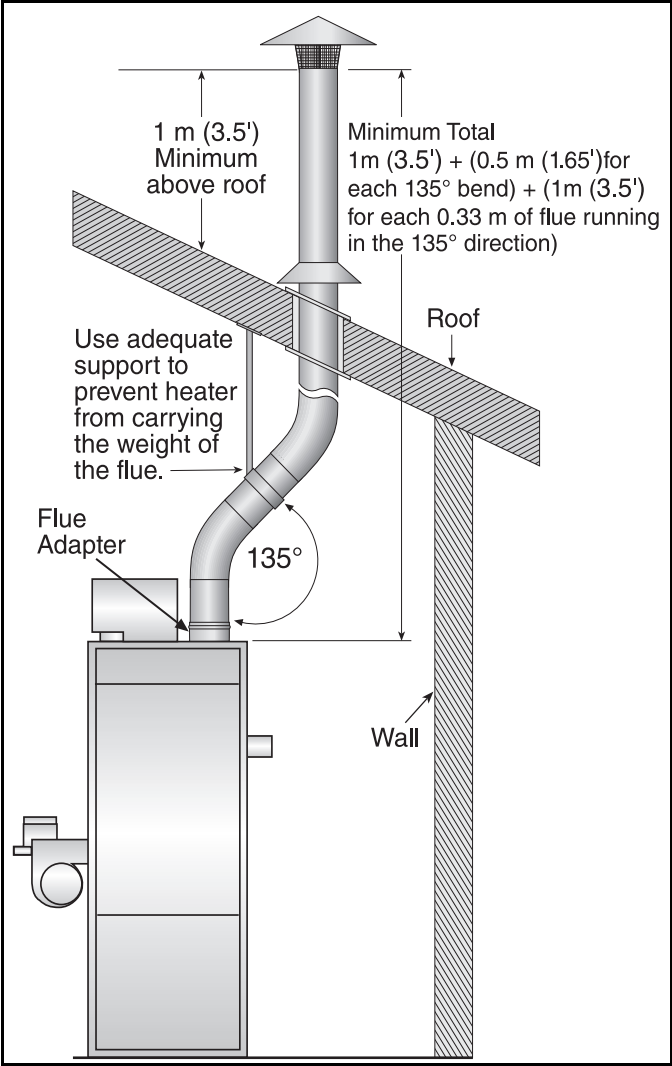


Figure 6: Offset Flues with 135° Bends



6.2 Type B<sub>22</sub> Appliance

The flue must terminate outside the building and be fitted with a low resistance terminal.

See Page 15, Figure 3 through Page 16, Figure 4.



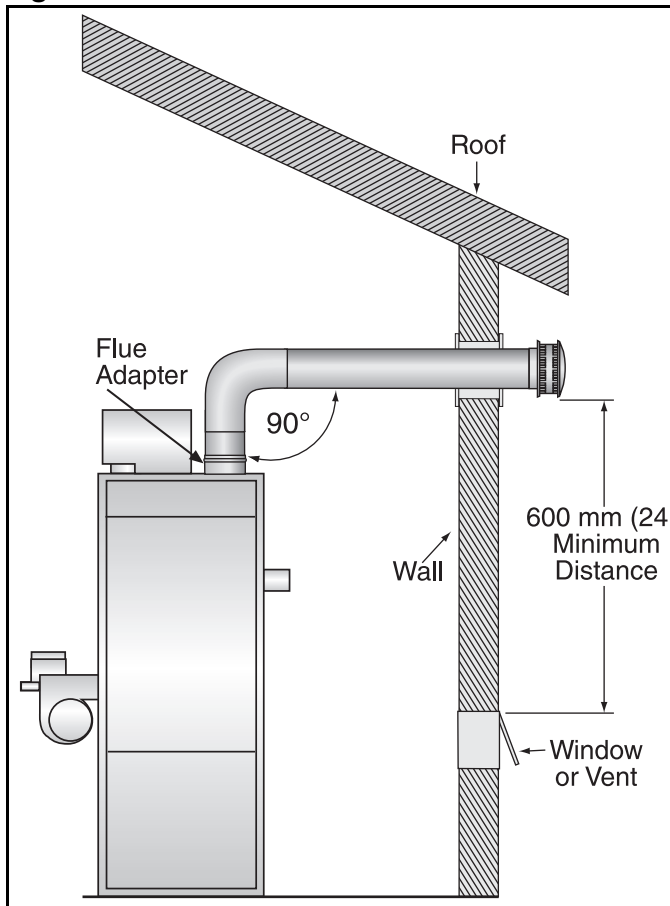
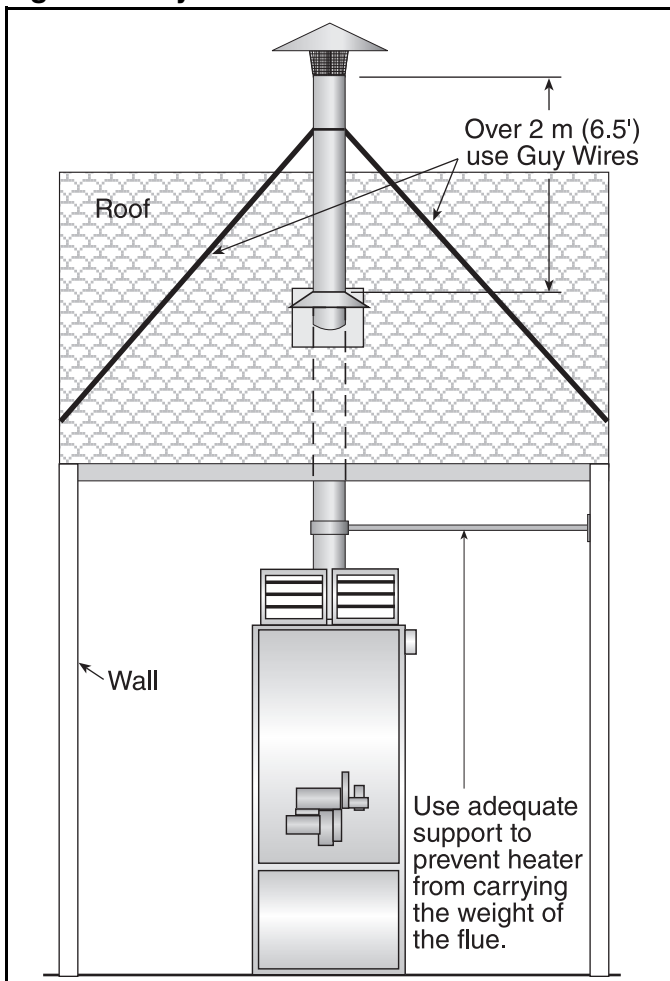
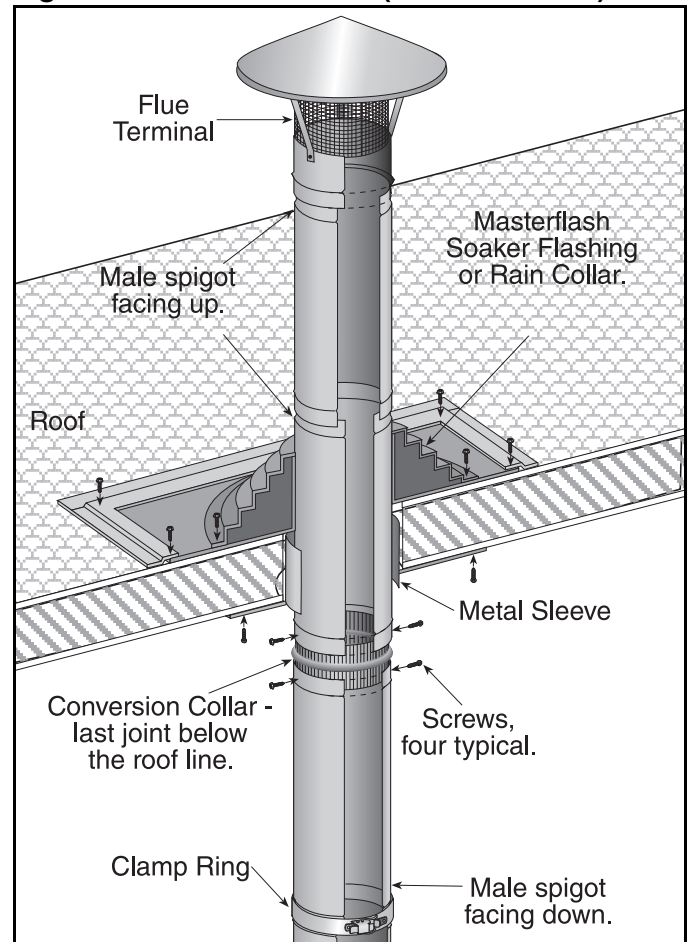
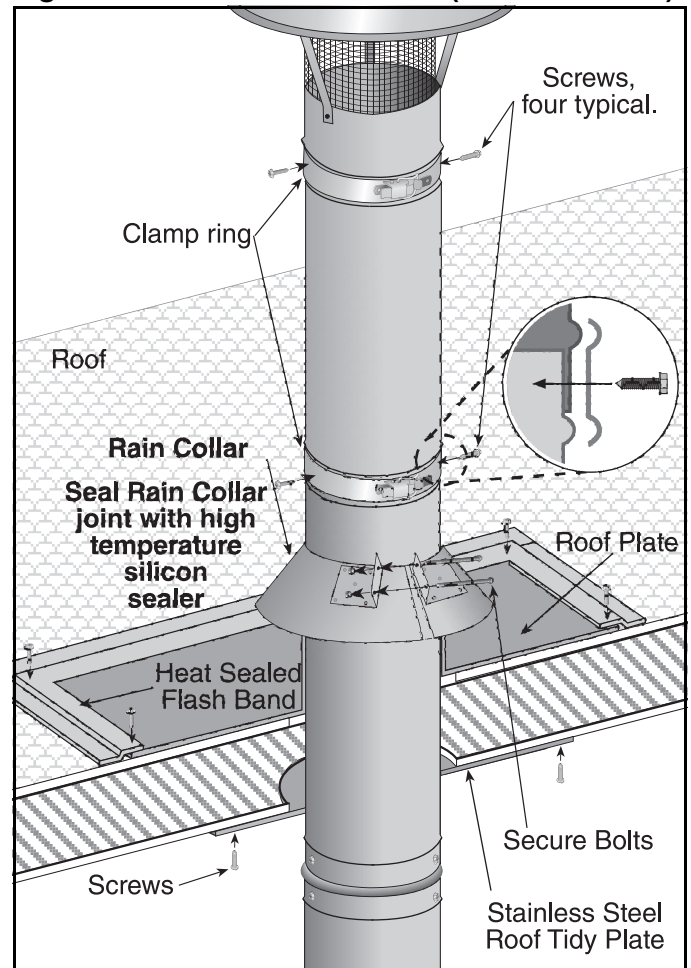
**Figure 7: 90° Horizontal Flue****Figure 8: Guy Wire****Figure 9: Socket Direction (Stainless Steel)****Figure 10: Flue and Roof Detail (Stainless Steel)**

Figure 11: Flue Installation (Models 15 - 100)

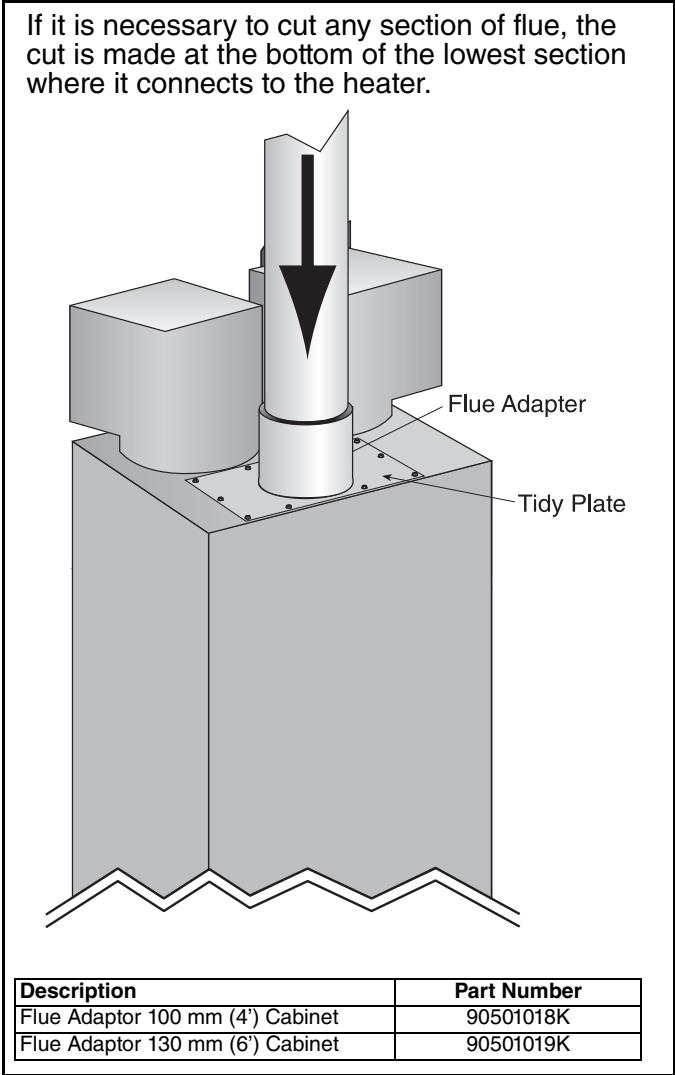
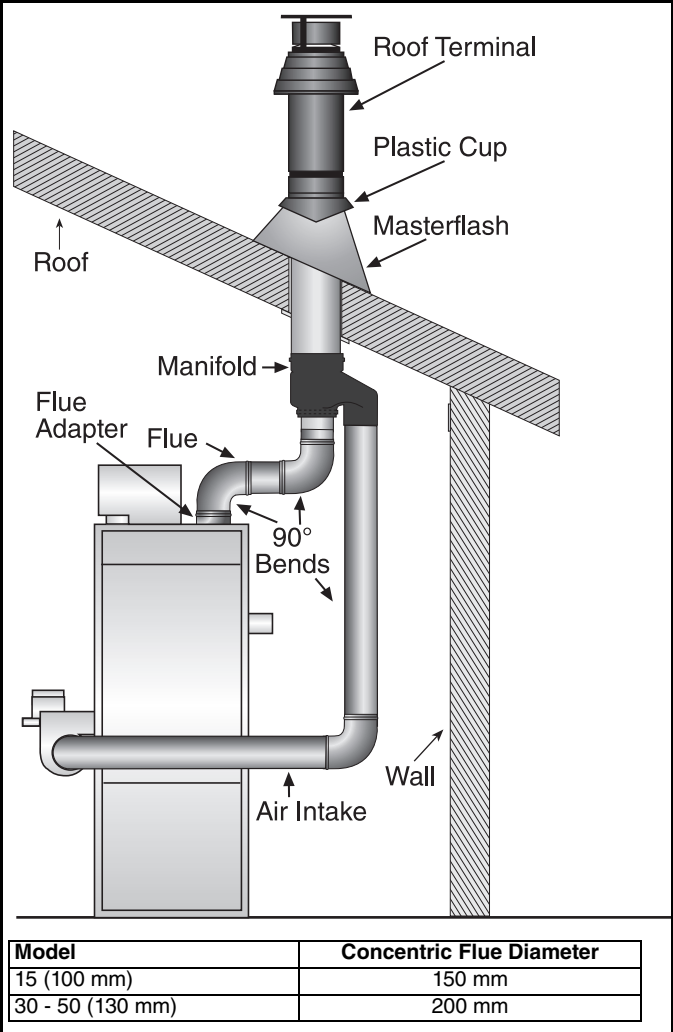


Figure 12: Balanced Flue (Vertical)

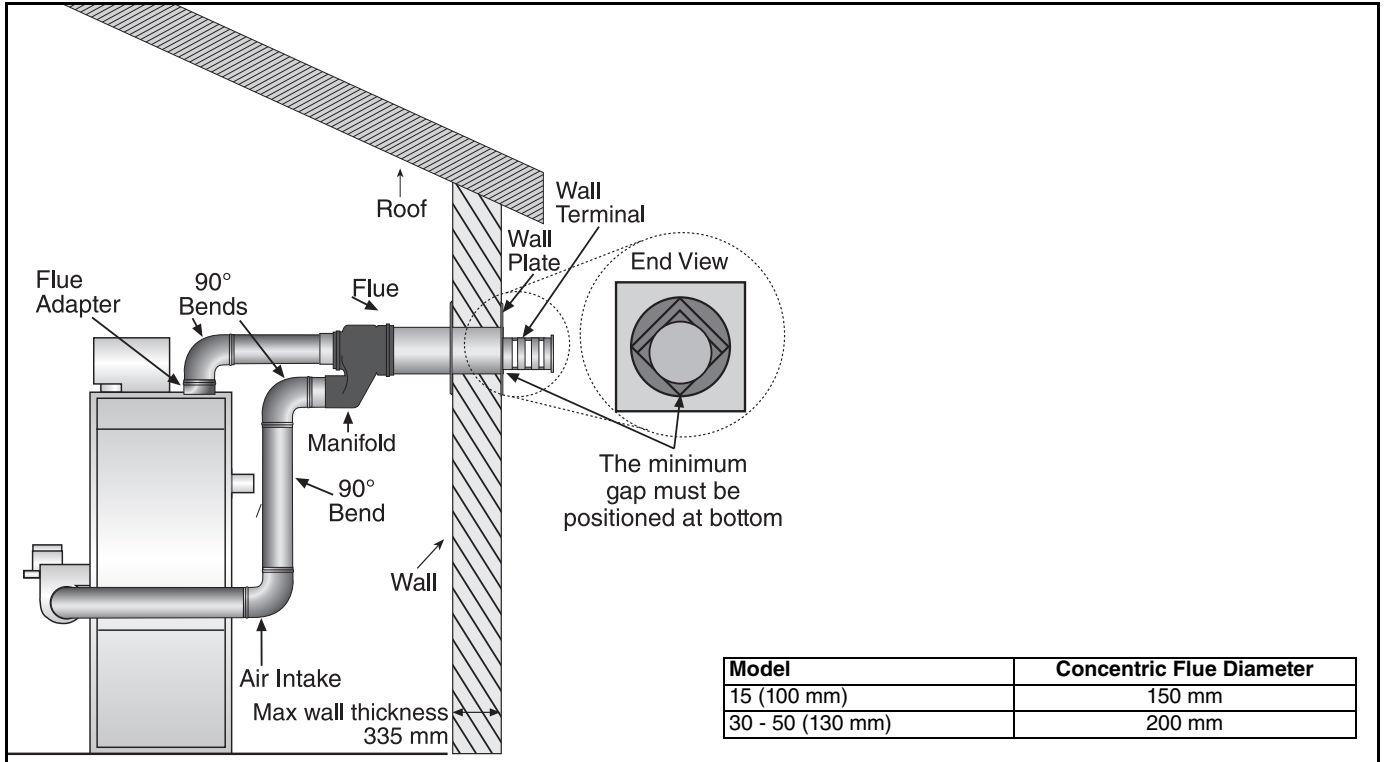


**NOTE:** The balanced flue option is only available on models 15, 30, 40 and 50.

**6.3 Type C<sub>12</sub>, C<sub>32</sub> & C<sub>62</sub> Appliance**

Room Sealed.

The heaters are designed to be installed as room sealed appliances. The flue and air intake are run as separate pipes to the special concentric wall or roof terminal. See Page 20, Figure 12 through Page 21, Figure 13. The wire mesh inside the fresh air adapter on the heater must be removed prior to installation.

**Figure 13: Balanced Flue (Horizontal)**

**SECTION 7: AIR SUPPLY**


<p><b>Explosion Hazard</b></p> <p><b>Equipment must have access to uncontaminated air at all times.</b></p> <p><b>Failure to follow these instructions can result in death, injury or property damage.</b></p>

**7.1 Room Sealed Installation**

When installed as a room sealed heater, the air for combustion is drawn in from outside the building. It is important to ensure that there is adequate ventilation to provide air for the distribution fan/s.

**7.2 Open Flued Installation**

It is important to ensure that there is adequate air supply at all times for both combustion and heating requirements in accordance with local and national codes. When installed in this mode, the air supply to the heater must also be fitted with a low resistance terminal to prevent the ingress of debris. See *Page 15, Figure 3* or *Page 16, Figure 4*.

**7.2.1 Heaters Installed Within the Heated Space**

Where the volume of the heated space is greater than 4.7 m<sup>3</sup> per kilowatt of total rated heat input and the air change rate is at least 0.5/h, additional high and low level ventilation will not be required.

For a building having an air change rate less than 0.5/h, ventilation will be necessary in accordance with local and national codes. Ventilation direct to outside must be provided as follows:

- Heaters up to 70 kW heat input: 5.0 cm<sup>2</sup> per kW of rated heat input
- Heaters above 70 kW heat input: 350 cm<sup>2</sup> + 2.5 cm<sup>2</sup> per kW of rated heat input above 70 kW

**7.3 Building Ventilation**

Where ventilation is required, air must be taken from an outside point where it is not likely to be contaminated or obstructed.

Where natural ventilation is used, suitable ventilation with outside air at low level must be provided in accordance with *Section 7.2.1* and local and national codes.

Where mechanical ventilation is used, extract rate must be 5% - 10% less than the inlet rate. The

mechanical ventilation must be interlocked with the burner on the heater.

**7.4 Isolated Equipment Rooms**

Ventilation must prevent the isolated equipment room temperature from exceeding 32° C as well as prevent any negative air pressure within the room. Any isolated equipment room containing air heaters will require permanent air vents direct to outside air in compliance with local codes.

Where natural ventilation is used, suitable permanent openings at low and high level, communicating directly with the outside air, must be provided.

Where mechanical ventilation is used, extract rate must be 5% - 10% less than the inlet rate. The mechanical ventilation must be interlocked with the burner on the heater.

## SECTION 8: FUEL PIPE WORK

**⚠ WARNING****Fire Hazard**

**Connect gas supply according to Figure 14.**

**Connect oil supply according to Section 8.2.**

**Do not use gas/oil supply pipe and electrical connections to support the heater's weight.**

**Gas can leak if not installed properly.**

**Failure to follow these instructions can result in death, injury or property damage.**

**⚠ WARNING****Explosion Hazard**

**Leak test all components of gas pipe work before operation.**

**Gas can leak if pipe work is not installed properly.**

**Do not high pressure test gas pipe work with heater connected.**

**Failure to follow these instructions can result in death, injury or property damage.**

**8.1 Connections**

Connect the heater to the gas supply, ensuring that the final connections are as follows:

- Gas supply pipe is run in medium or heavy gauge tubing in compliance with local and national codes.
- The gas supply pipe is adequately sized to carry the total volume of gas for the complete installation.
- An isolating valve and union connection should be used and fitted into the supply adjacent to the heater.

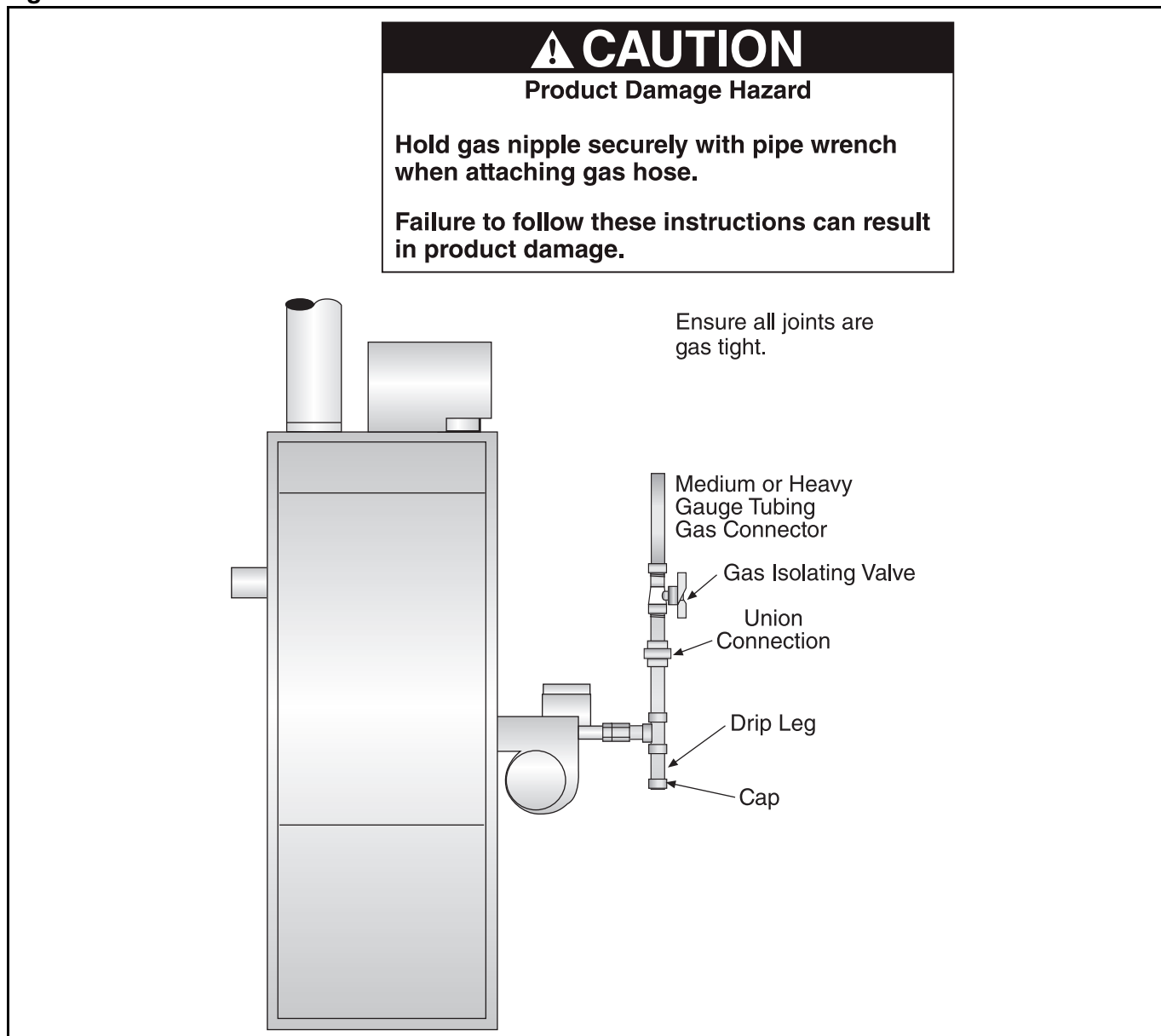
**IMPORTANT** - The complete installation must be purged and tested for gas soundness in accordance with local and national codes.

- **Check the pipe and tubing ends for leaks before placing heating equipment into service. When checking for gas leaks, use an approved leak detection fluid; never use an open flame.**

It is important that the gas supply pipe and the electrical connections do not support any of the heater's weight.

A gas meter is connected to the service pipe by the Gas Supply Company. Any existing meter should be checked, preferably by the company, to ensure that the meter is adequate for the rate of gas supply required.

Installation pipes must be fitted in accordance with local and national codes. Pipe work from the meter to the heater(s) must be of adequate size.

**Figure 14: Gas Connection**

## 8.2 Fuel Oil Supply

### 8.2.1 Fuel Storage Tank

The fuel storage tank should be located outside the building as close as possible to the heater. The tank must be installed per local and national codes.

### 8.2.2 Fuel Pipes

The fuel pipes must be sized to ensure an adequate supply of oil to the entire installation. Galvanised pipe must not be used for oil installations. The fuel pipe must terminate at each heater with an isolating manual valve, a fire valve and a fuel filter. See Page 16, Figure 4. The fusible link of the fire valve should be installed 100 mm (4 in) above the burner.

The heater's oil burner pump inlet is provided with a flexible oil line which should be used for the final connection. When making the final connection to the heater, do not block any of the removable panels of the heater. All COMBAT® oil-fired cabinet heaters are supplied with burner pumps fitted for one pipe systems.

### 8.2.3 Gravity Feed Systems

The simplest installation is a gravity feed system. This system relies on the head of the fuel to push the fuel through the system. See Page 16, Figure 4.

### 8.2.4 B. M. Oil Lifter

Where a gravity feed system cannot be used, a B. M. oil lifter may be used for small installations up to the equivalent of a single model 050 on minimum lift or a single model 020 on maximum lift.

The fuel output from the oil lifter is gravity fed. The B. M. oil lifter requires a constant 230 V 50 Hz 1 Ø electrical supply. The maximum pipe size to be used on the suction side is 1/4" ID, 5/16" OD (8 mm). For maximum loading of oil lifters See Page 25, Figure 15. Consult the manufacturer's information regarding the need to prime these devices.

### 8.2.5 Pressurised Systems

See Page 26, Figure 16. For larger installations, a pressurised system may be used. In this type of

system, the pump draws fuel from the tank, then pushes it through the installation under pressure. The pressure is controlled at the pump by a pressure relief valve at approximately 0.8 BAR (12 psi). When a pressurised system is used, a pressure reducing valve set at approximately 0.3 BAR (5 psi) should be installed on the fuel inlet to each heater

after the manual isolating valve. This protects the oil pump from the danger of possible over pressure under fault conditions. The electrical supply for the pump installation will depend upon the type of pumps chosen, but will normally be set to run continuously.

Figure 15: B. M. Oil Lifter

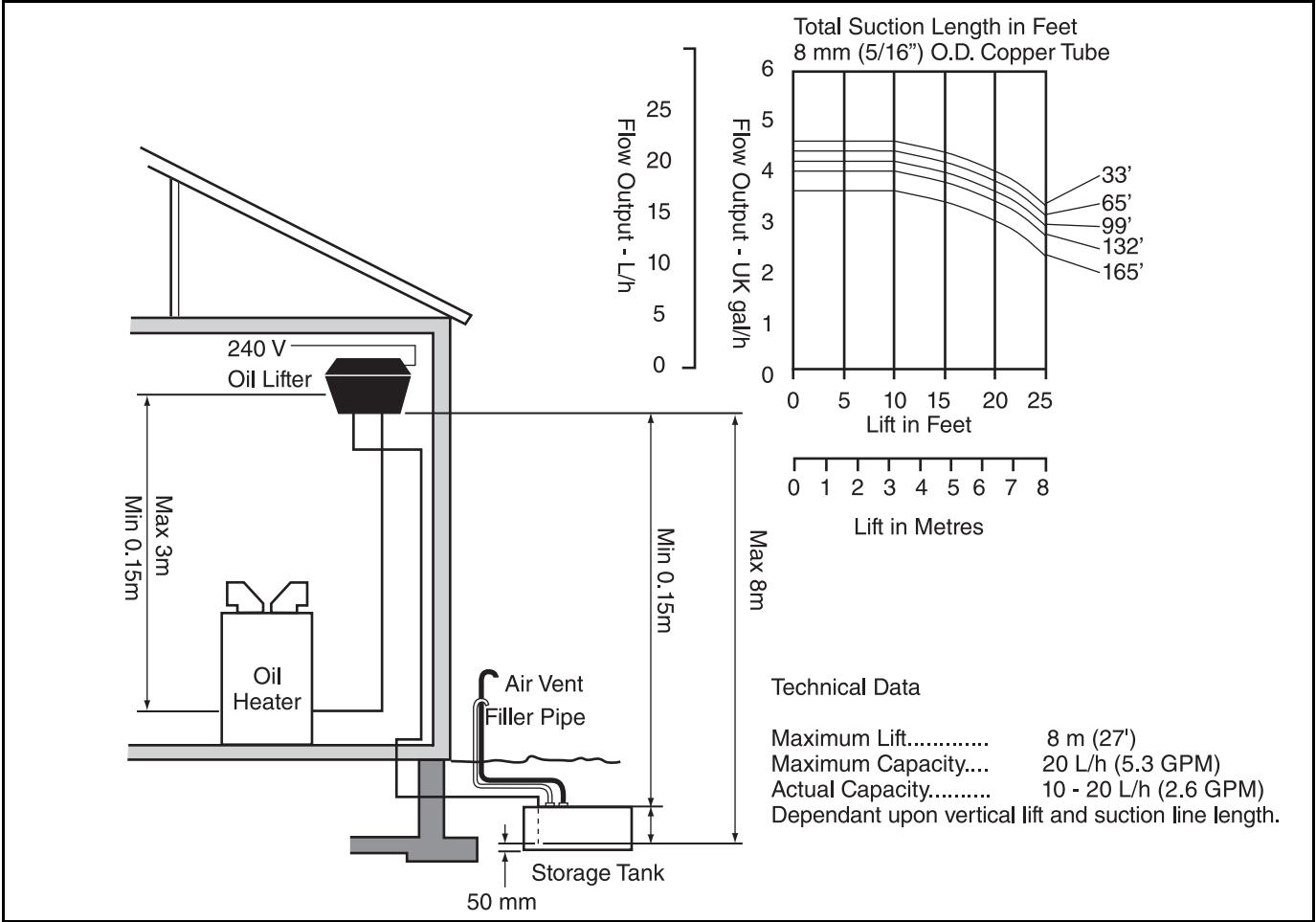
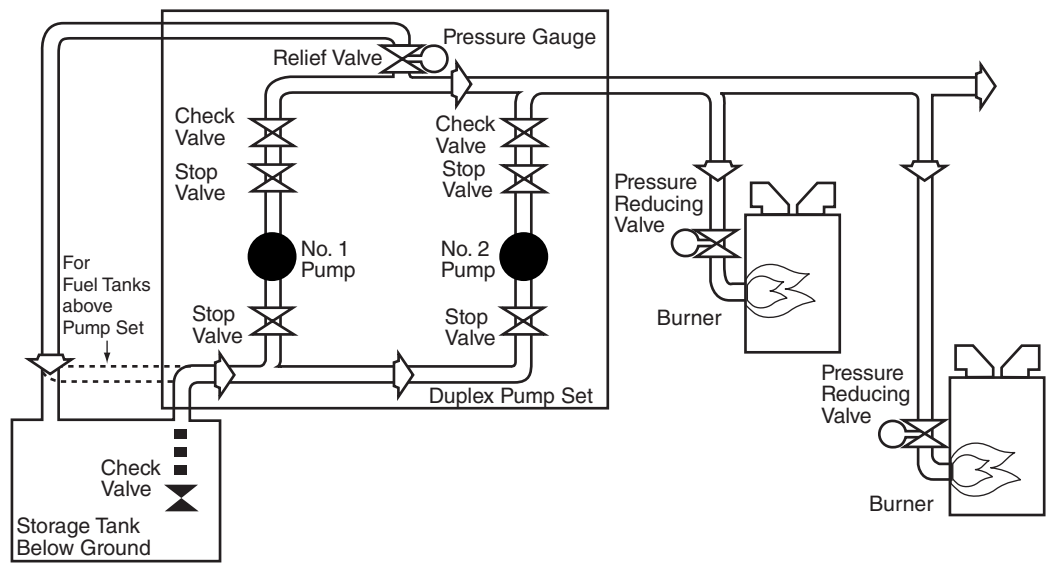


Figure 16: Pressurised System Installation - Duplex System



(The system shown has one pump for run and the other for standby. The valves allow the standby pump to be removed for maintenance while the system is still running).



## SECTION 9: WIRING AND ELECTRICAL INFORMATION

<b>⚠ DANGER</b>

<p style="text-align: center;"><b>Electrical Shock Hazard</b></p> <p><b>Disconnect electric before service.</b></p> <p><b>More than one disconnect switch may be required to disconnect electric from equipment.</b></p> <p><b>Equipment must be properly grounded.</b></p> <p><b>Failure to follow these instructions can result in death or electrical shock.</b></p>

**9.1 Electrical Supply**

A 230 V 50 Hz 1 Ø supply is required for all heater Models 015 to 030 connected to the heater terminals L1, N and Earth.

Standard models 040 to 0100 and all High Flow models require a 400 V 50 Hz 3 Ø and neutral supply connected to the heater terminals L1, L2, L3, N and Earth.

All heaters and controls must be correctly earthed. All external wiring must comply with the relevant IEE and local regulations and be carried out by a qualified electrician.

Polarity "L & N" must be correct. The voltage between neutral and earth should be 0 and never exceed 15 volts.

An isolator with a contact separation of at least 3 mm (.12") on all poles should be installed adjacent to the heater, but not attached to it, to disconnect all supplies to the heater and where necessary to isolate the remote control panel.

**9.2 Remote Controls**

The heater is designed to be operated by controls installed remotely from the heater. *See Page 28, Section 9.3. through Page 39, Section 9.14.*

**9.2.1 Burner Controls (Thermostat)**

Controls to operate the burner must be voltage free contacts connected between terminals 2 and 3 of the main terminal block.

**9.2.2 Positioning Room Thermostats or ROBERTS GORDON® Control**

A room thermostat or Roberts-Gordon Europe Limited control should be mounted on a wall or column at a height of approximately 1.5-1.8 m (5'-6') from the floor to measure the ambient temperature.

It should be clear of both cold draughts and the direct path of warm air from the heater.

**9.2.3 Remote Frost Thermostat**

When required, connect to terminals 2 and 3 in the main terminal block.

Locate the thermostat within the heated space adjacent to the most vulnerable equipment that requires protection.

*See Page 28, Section 9.3 through Page 39, Section 9.14.*

**9.2.4 Controls for High/Low Burner Operation**

For heaters with a high/low burner, the controls will need to provide two stage signal to operate these burners. This is best provided by a two stage thermostat.

The thermostat may control the heater outlet temperature if the heater is designed for a duct distribution system or the room temperature. The site wiring will be across terminals 2 and 3 for any time control and the on/off function of the burner (stage two), and across terminals 7 and 8 for the high fire (first stage) setting.

The burner will then operate as follows:

Temp. from cold up to the 1st set point.....	..... Full fire at max. rate
Temp. above 1st set point up to 2nd set point.....	..... Low fire at min. rate
Temp. above 2nd set point .....	Off.

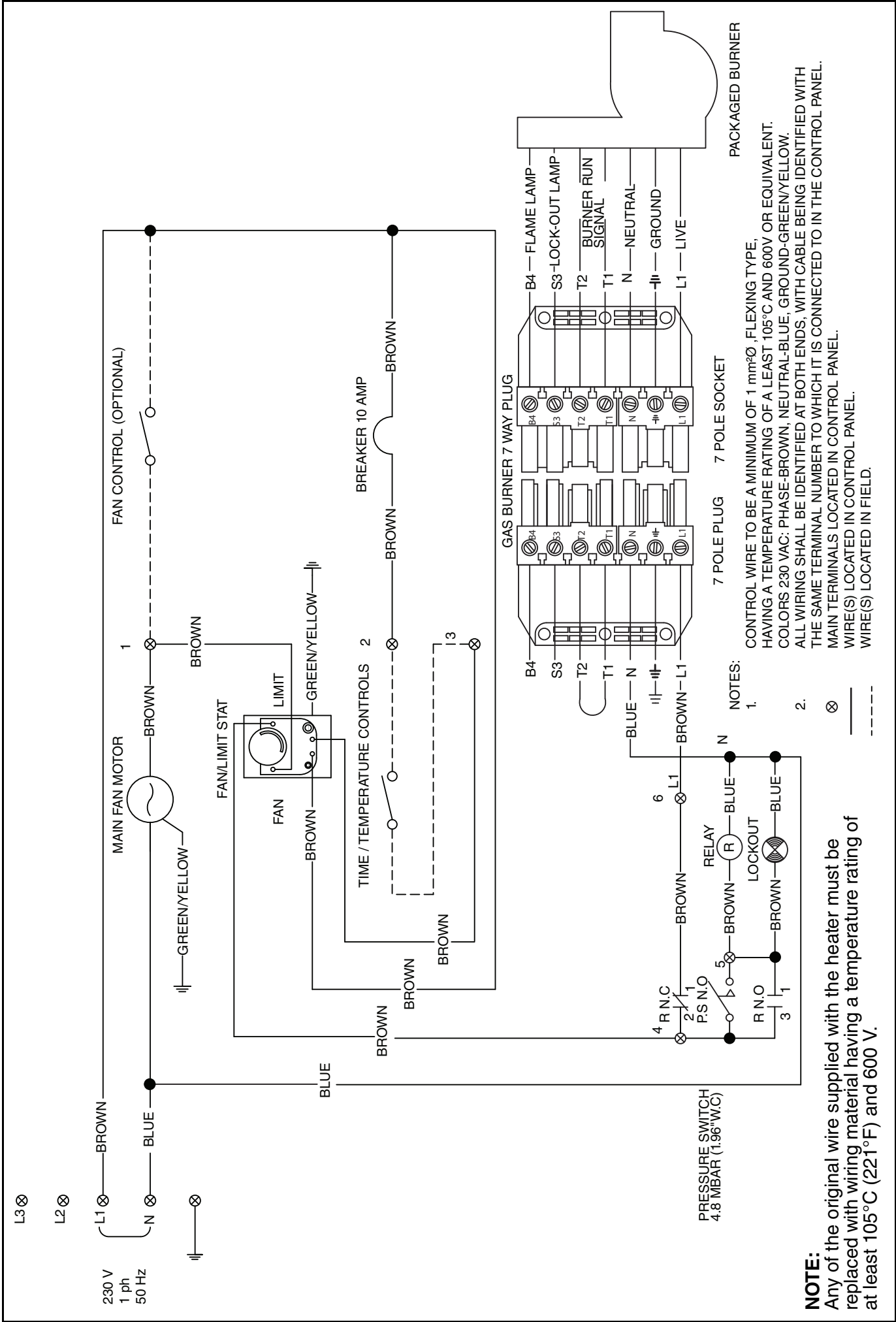
**9.2.5 Remote Fan Controls**

The fan will operate automatically providing there is a constant 230 V supply to the main terminals.

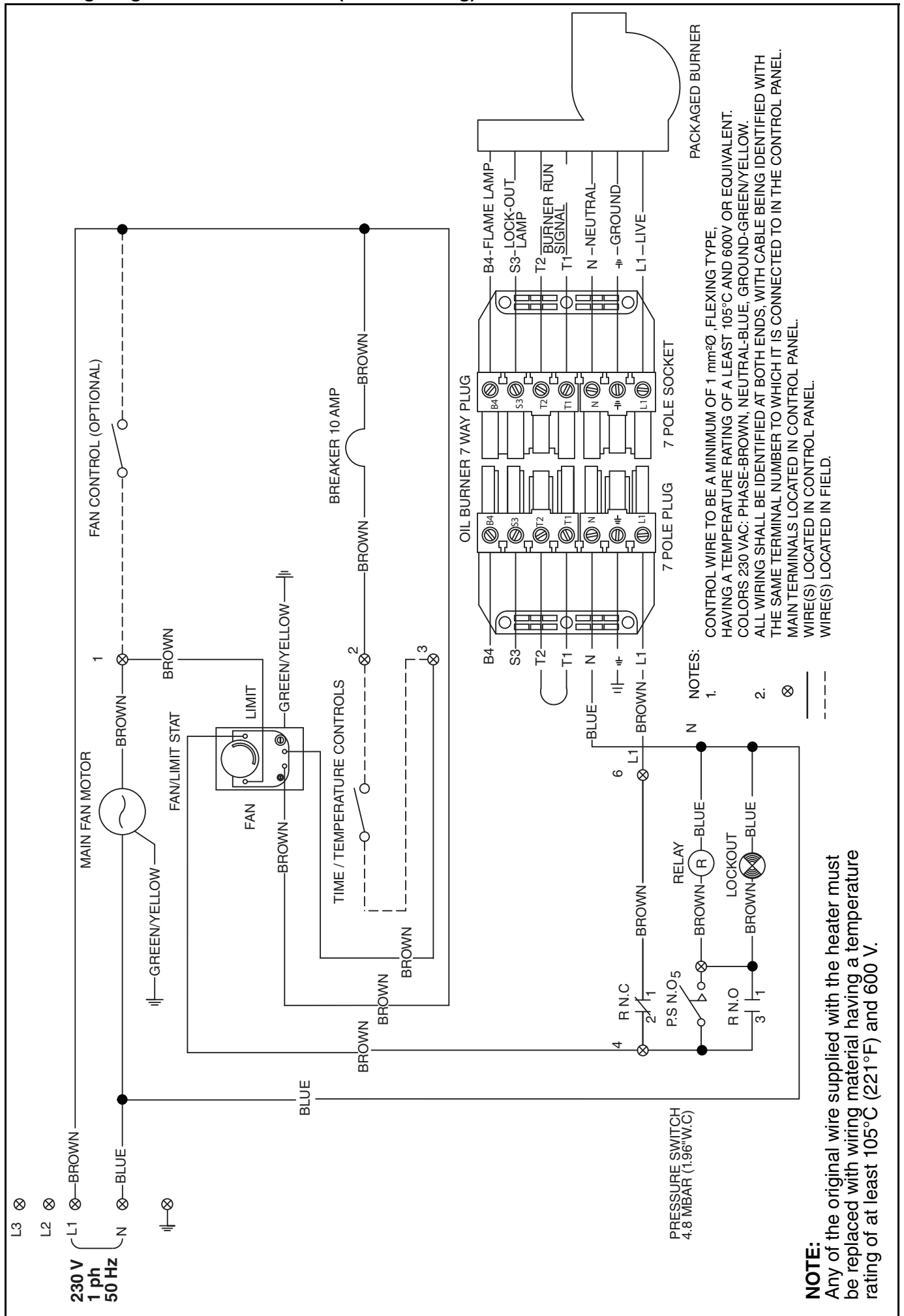
A switch or control wired between terminals L & 1 in the terminal block will allow external control of the fan(s).

The fan may be controlled to operate continuously from an external control, with the burner cycling on and off, providing that the fan run-on at close down is not impaired.

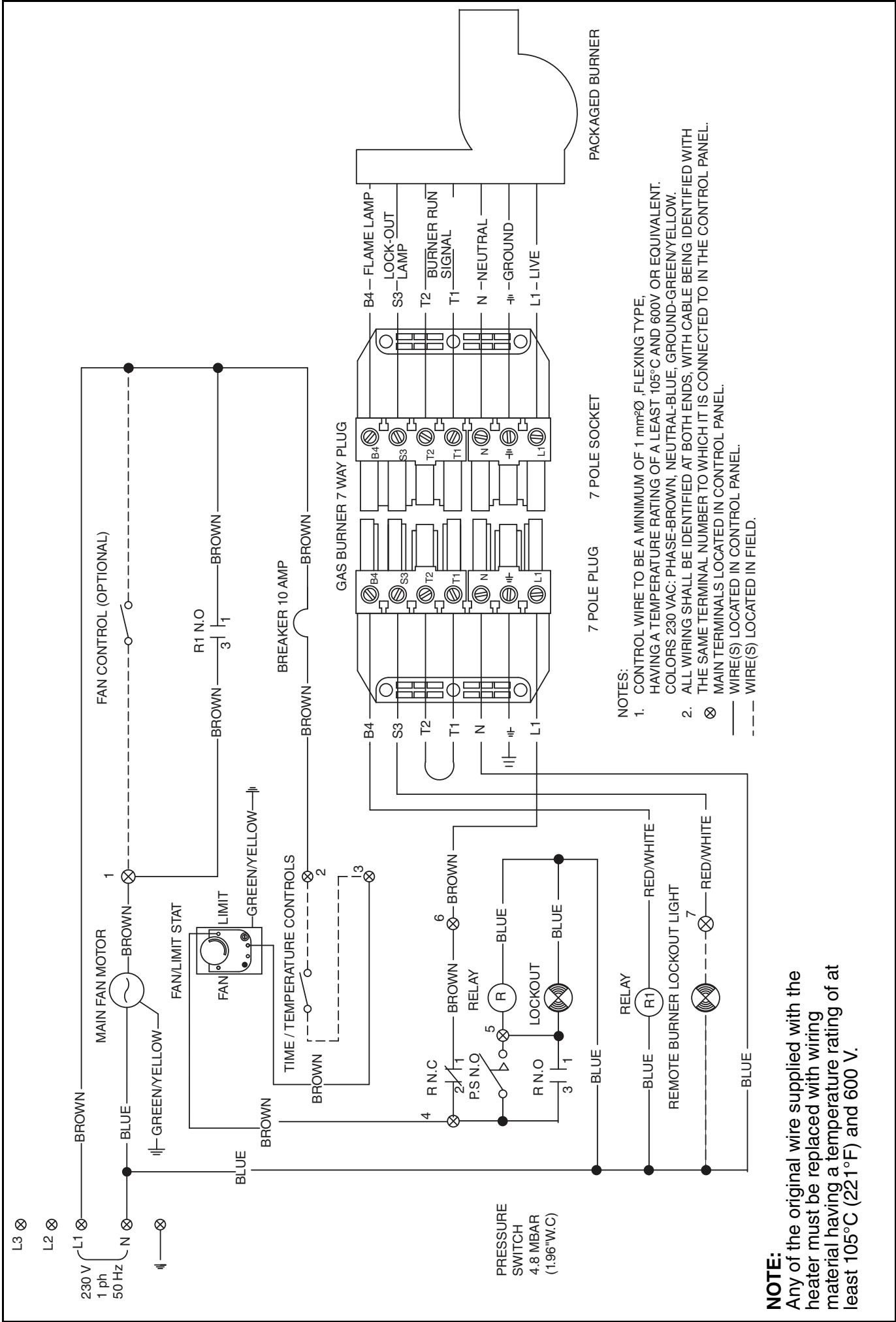
9.3 Wiring Diagram Gas Models 15-30 (floor standing)



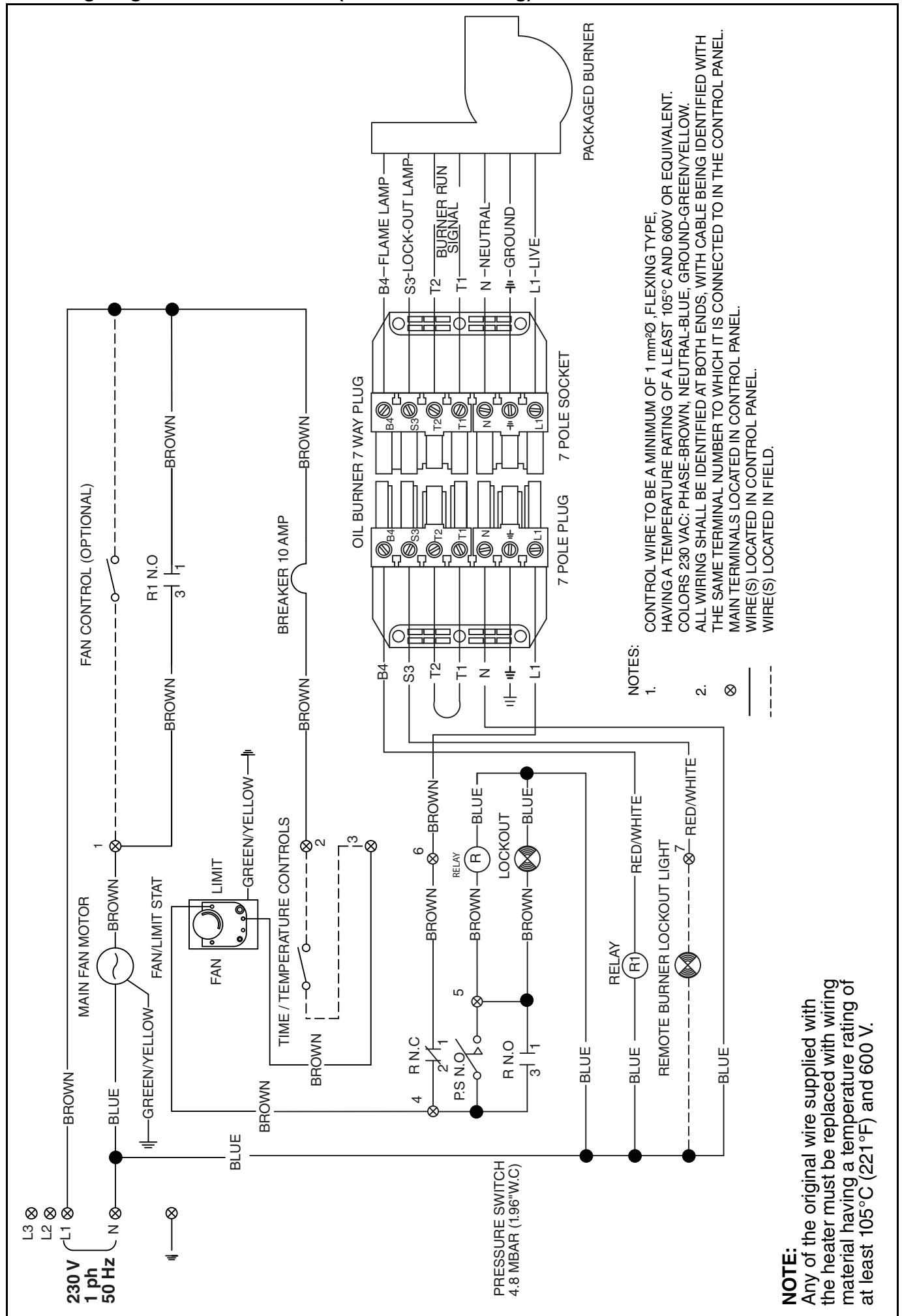
## 9.4 Wiring Diagram Oil Models 15-30 (floor standing)



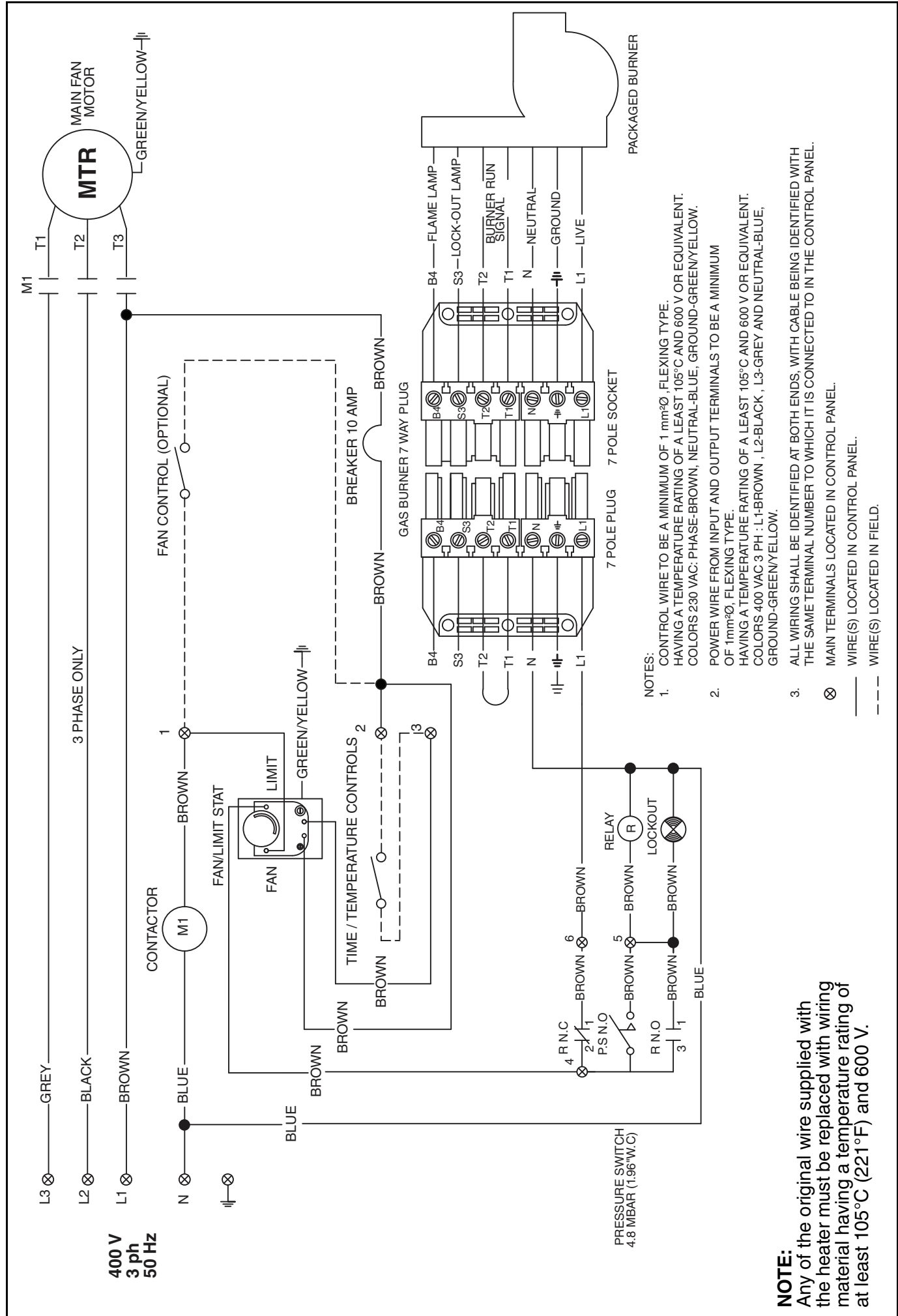
9.5 Wiring Diagram Gas Models 15-30 (horizontal mounting)



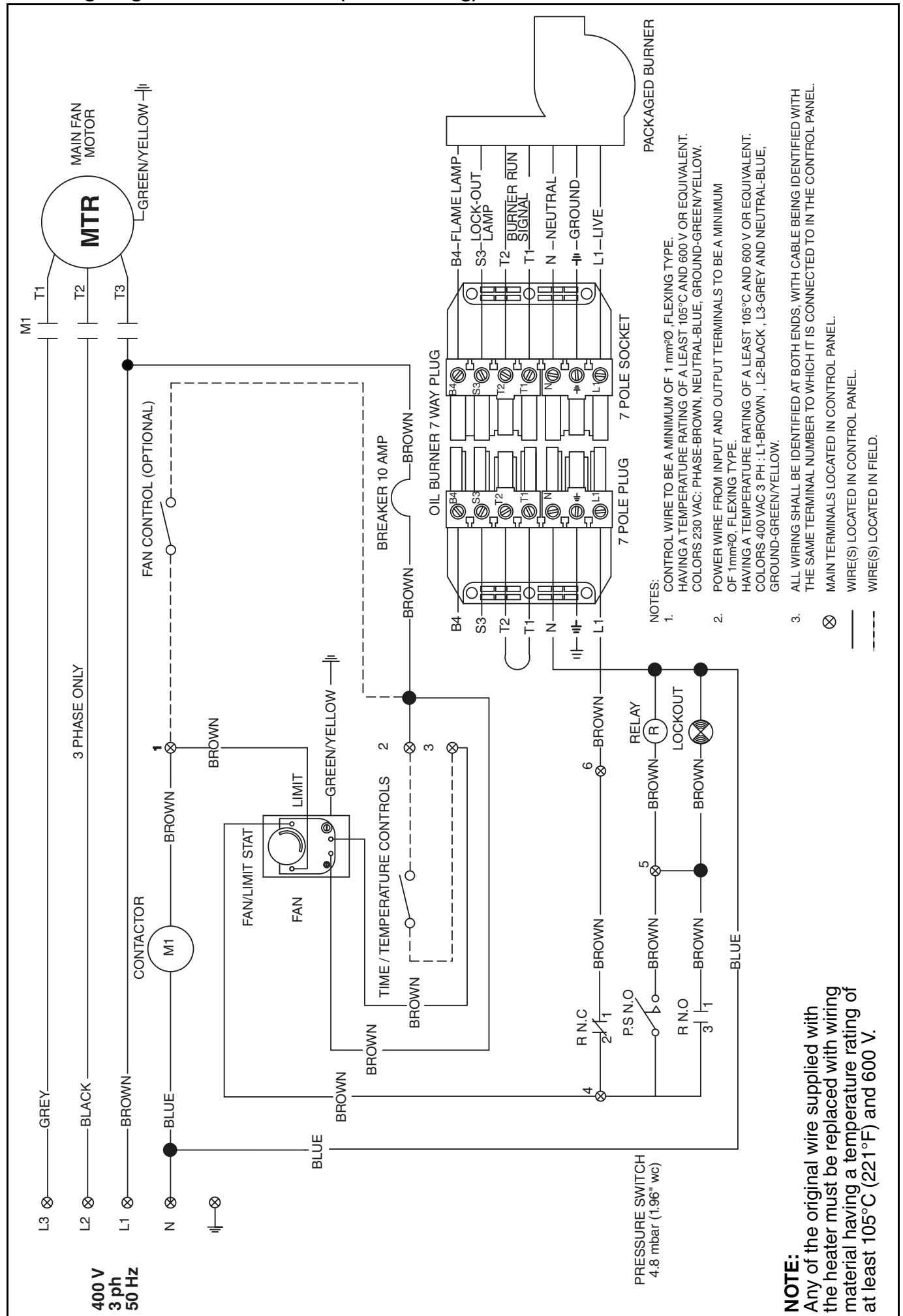
## **9.6 Wiring Diagram Oil Models 15-30 (horizontal mounting)**



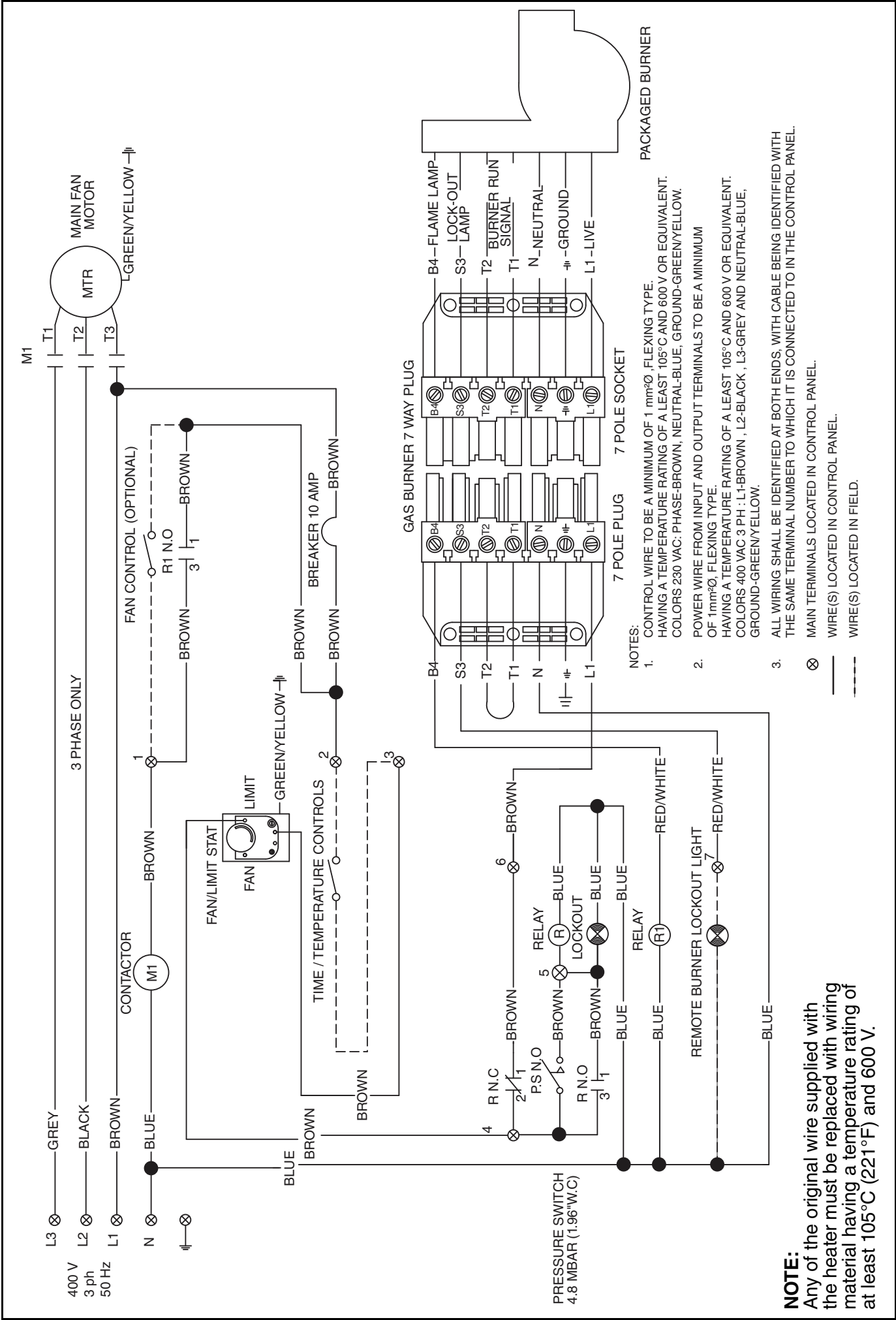
## 9.7 Wiring Diagram Gas Models 40-50 (floor standing)



## 9.8 Wiring Diagram Oil Models 40-50 (floor standing)

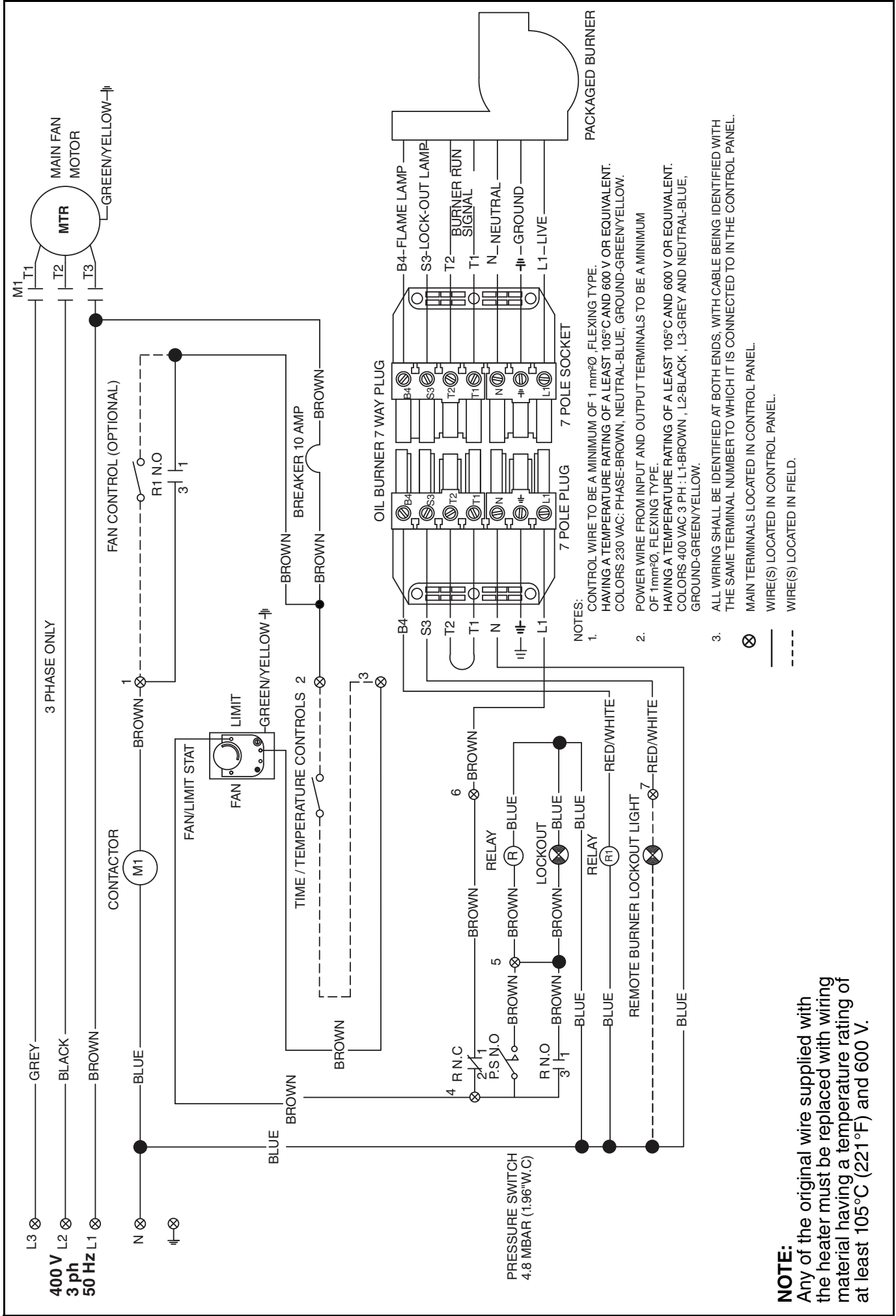


9.9 Wiring Diagram Gas Models 40-50 (horizontal mounting)

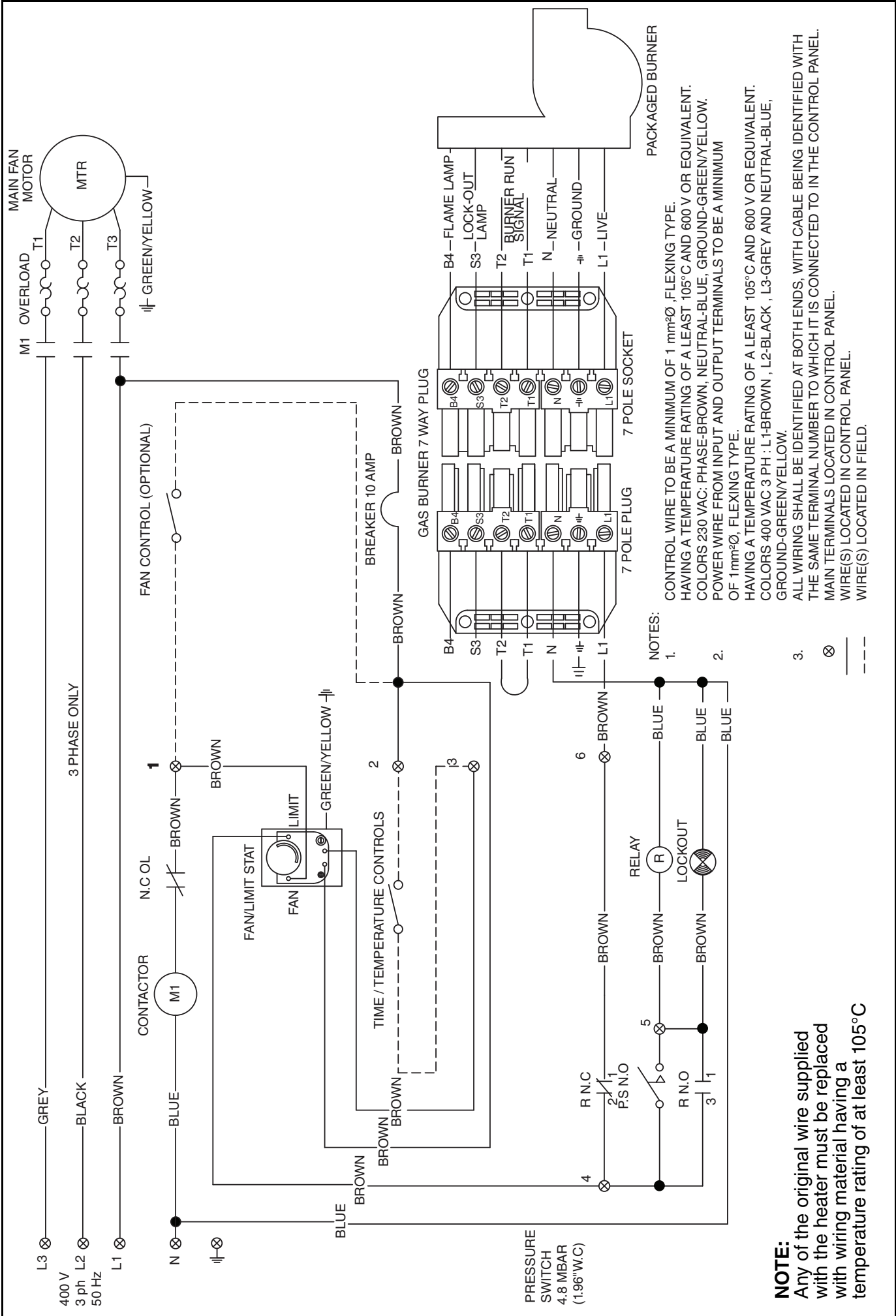




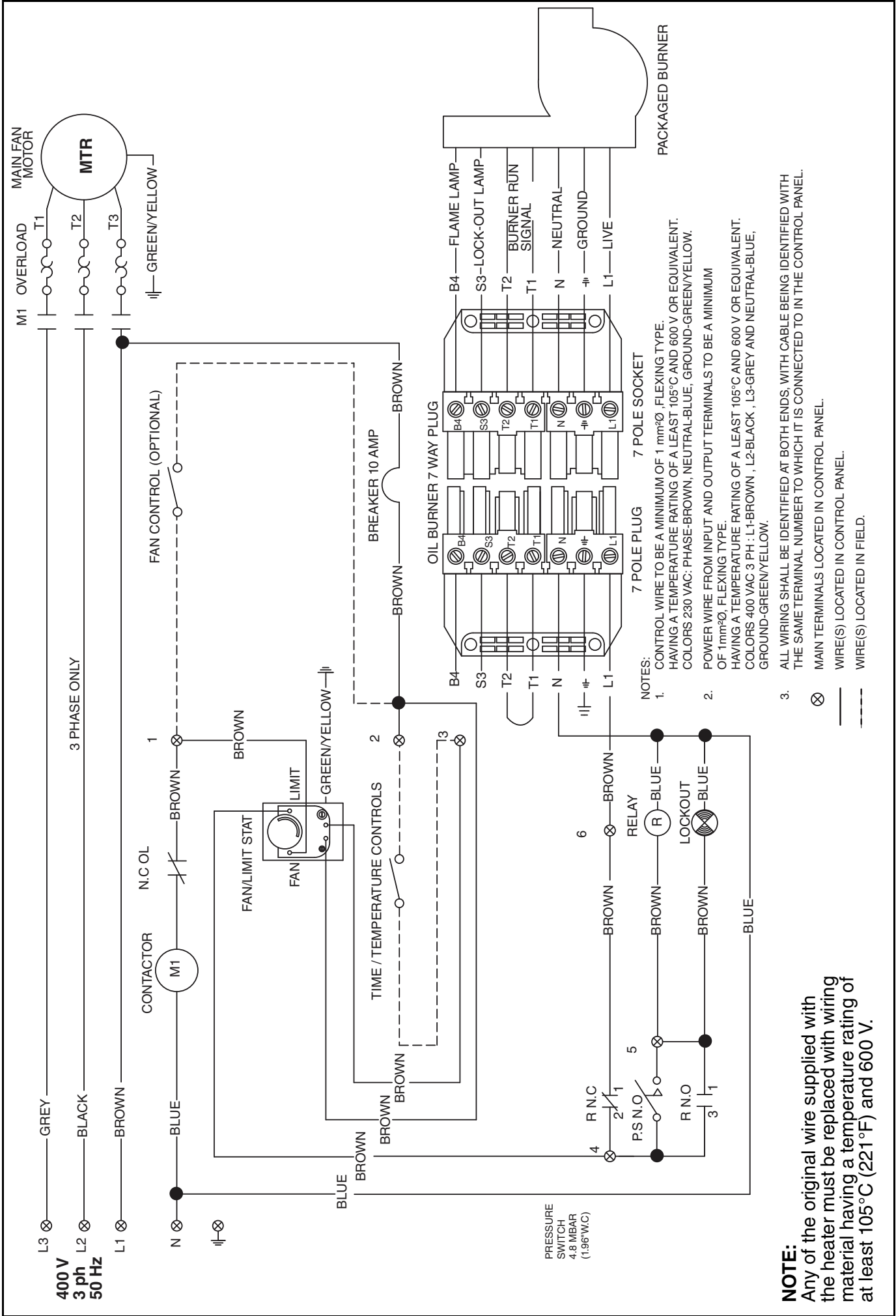
9.10 Wiring Diagram Oil Models 40-50 (horizontal mounting)



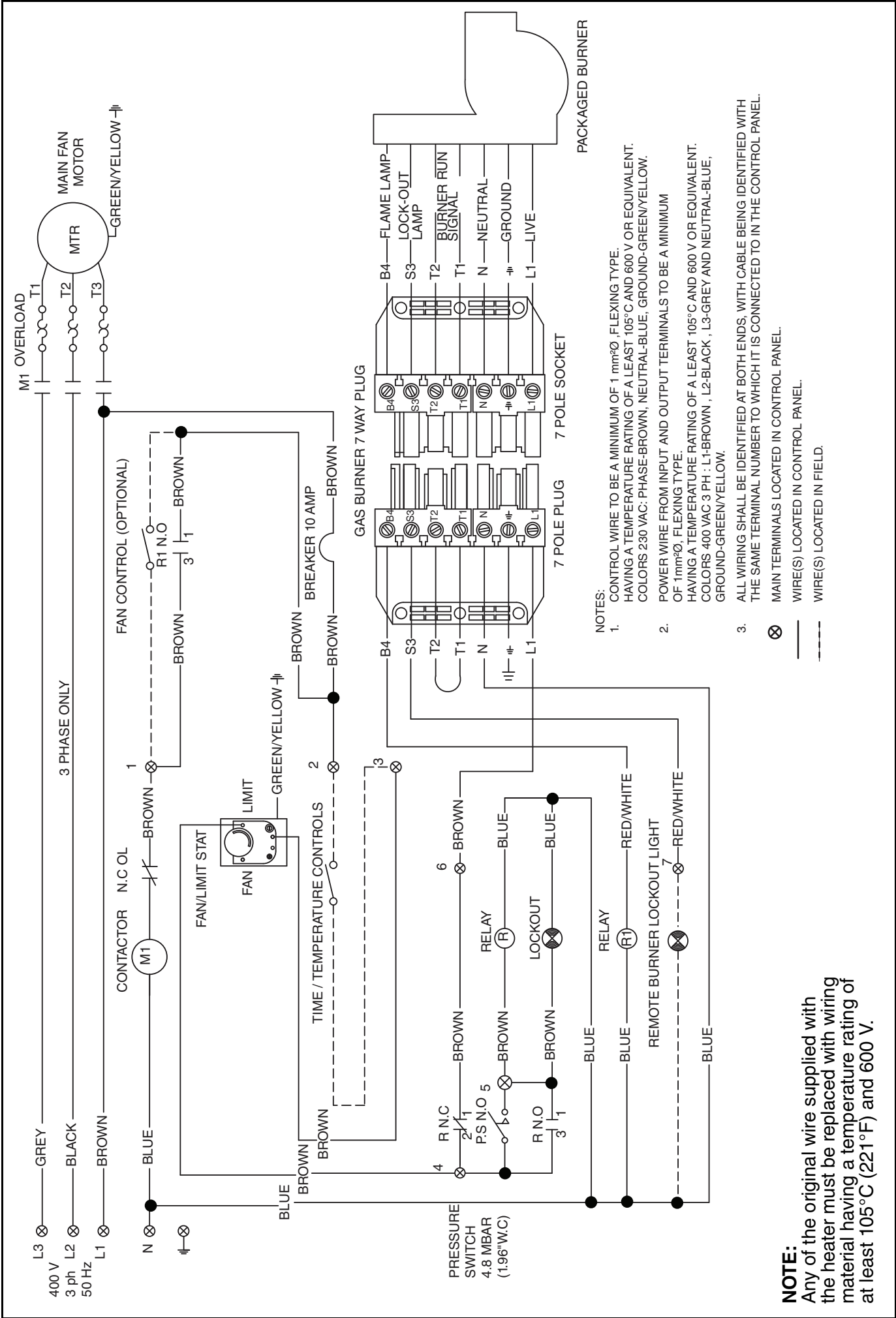
9.11 Wiring Diagram Gas Models 60-100 (floor standing)



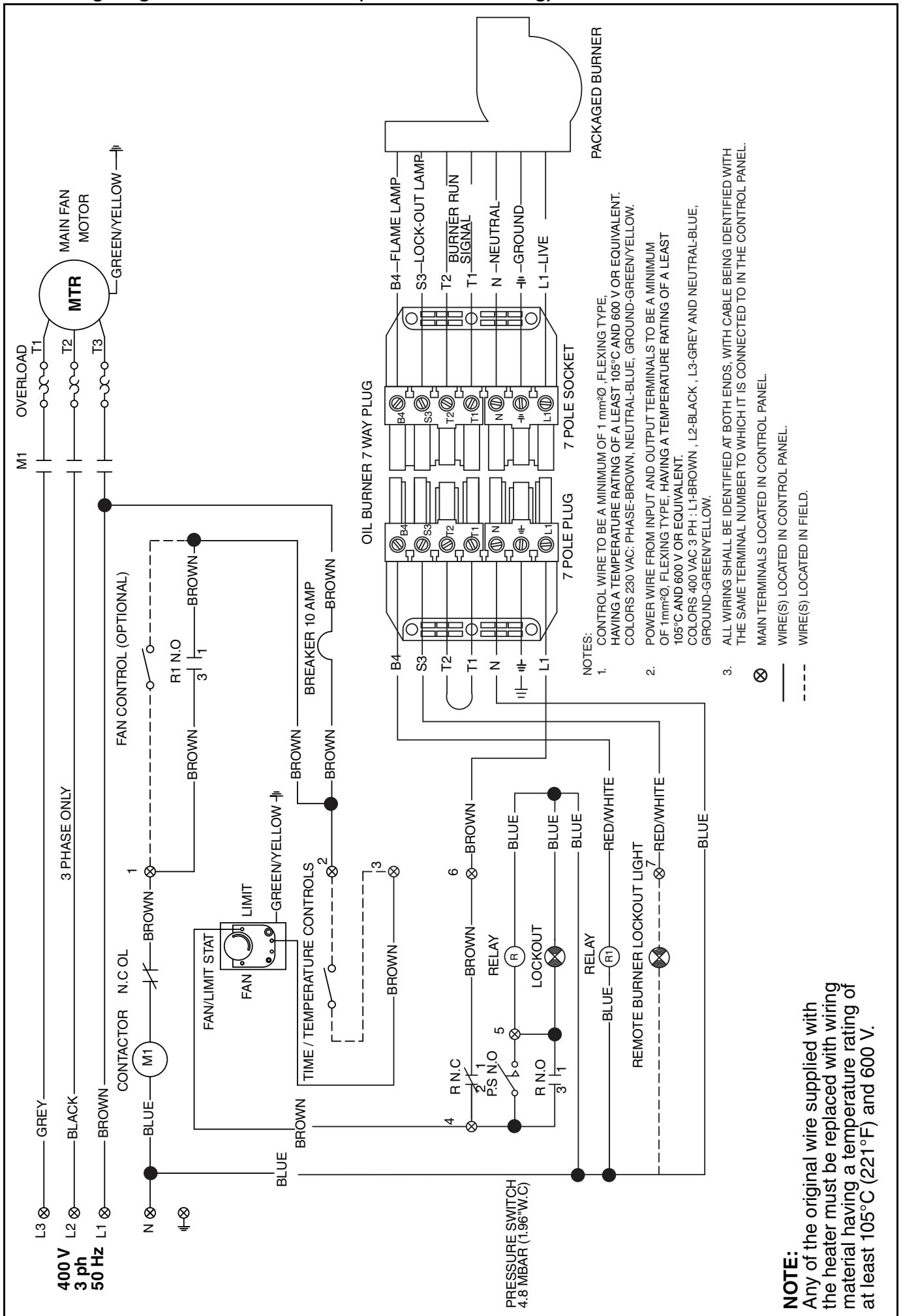
9.12 Wiring Diagram Oil Models 60-100 (floor standing)





9.13
Wiring Diagram Gas Models 60-100 (horizontal mounting)






### **9.14 Wiring Diagram Oil Models 60-100 (horizontal mounting)**



SECTION 10: COMMISSIONING

⚠ DANGER	
	
<p><b>Electrical Shock Hazard</b></p> <p>Disconnect electric before service.</p> <p>More than one disconnect switch may be required to disconnect electric from equipment.</p> <p>Equipment must be properly grounded.</p>	<p><b>Severe Injury Hazard</b></p> <p>Do not enter equipment while in operation.</p> <p>Equipment may start automatically.</p> <p>Do not operate with door open.</p> <p>Installation, operation and service must be done by a trained technician only.</p>
Failure to follow these instructions can result in death, electrical shock or injury.	

⚠ WARNING		
		
<p><b>Explosion Hazard</b></p> <p>Leak test all components of equipment gas piping before operation.</p> <p>Gas can leak if piping is not installed properly.</p> <p>Do not high pressure test gas piping with equipment connected.</p>	<p><b>Falling Hazard</b></p> <p>Use proper safety equipment and practices to avoid falling.</p> <p>Do not use any part of equipment as support.</p>	<p><b>Burn Hazard</b></p> <p>Allow equipment to cool before service.</p> <p>Internal components of equipment may still be hot after operation.</p>
Failure to follow these instructions can result in death, injury or property damage.		

Gas/Oil Fired Heater

Installation Code and Annual Inspections:  
All installation and service of ROBERTS GORDON® equipment must be performed by a contractor qualified in the installation and service of equipment sold and supplied by Roberts-Gordon Europe Limited and conform to all requirements set forth in the ROBERTS GORDON® manuals and all applicable governmental authorities pertaining to the installation, service, operation and labeling of the equipment. To help facilitate optimum performance and safety, Roberts-Gordon Europe Limited recommends that a qualified contractor conduct, at a minimum, annual inspections of your ROBERTS GORDON® equipment and perform service where

necessary, using only replacement parts sold and supplied by Roberts-Gordon Europe Limited.  
Read this manual carefully before installation, commissioning, operation, or service of this equipment. All components are accessed via the louvered access panel below the burner. Opening the door exposes live electrical connections and hot components.

10.1 Pre-Commission Checks

These instructions should be read in conjunction with the burner manufacturer's manual.  
**All pre-commission checks must be carried out before firing the heater.**  
Ensure that the heater and all controls are suitable for the fuel, pressure and electrical supply to which they are to be connected.

### 10.1.1 Louvers

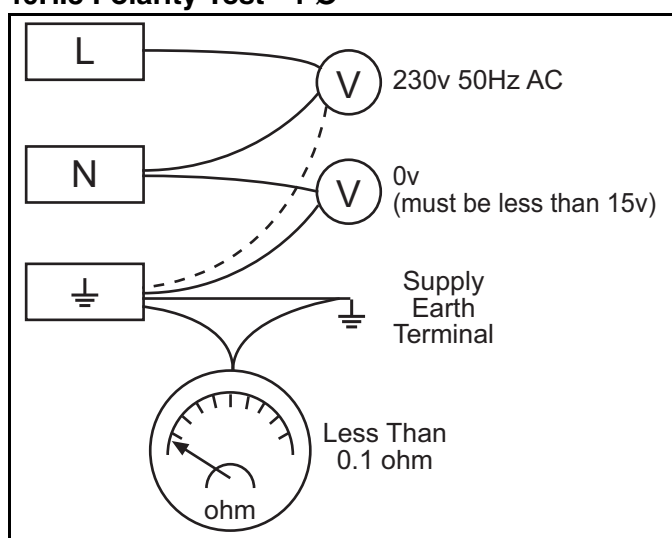
Where fitted, the air delivery louvers need to be set during commissioning to give the required air distribution.

### 10.1.2 Electrical Checks

All pre-commission checks must be carried out before commissioning the heater.

1. Check that all site wiring is connected in accordance with the appropriate wiring diagrams shown on *Page 28, Section 9.3 through Page 39, Section 9.14*.
2. Check the correct fuse size is fitted in the local supply isolator. See *Page 11, Section 4.4*.

### 10.1.3 Polarity Test - 1 Ø



### 10.1.4 Polarity Test - 3 Ø

Voltage between each phase L1, L2 and L3 and Earth or Neutral should be approximately 230 V. Voltage between any 2 phases should be approximately 400 V. Test Neutral to Earth as single phase.

### 10.1.5 Fan Rotation Check

Switch on the electricity supply at the isolator and the manual switch to "fan on" (if no remote fan switch is installed, press the white button on the fan/limit thermostat). On 3 Ø heaters, check the rotation of the main fan. Rotation should be in the direction of the arrow shown on the fan housing. If rotation is not correct, turn off the isolator and change over any two of the incoming supply phases and recheck. It will be necessary to remove the lower front or right side panel to see fan rotation.

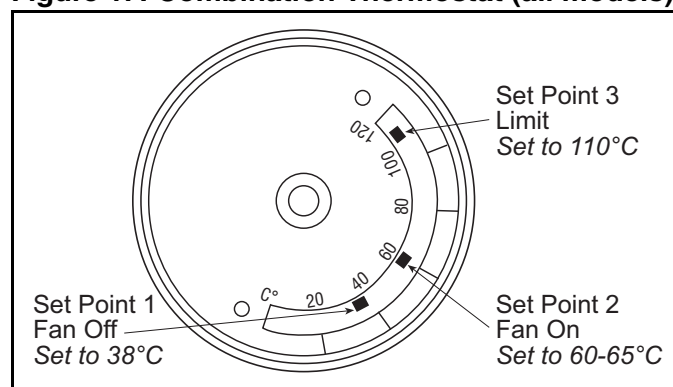
### 10.1.6 Fan Motor Overload Check

On 3 Ø belt drive heaters, check the correct settings of the fan motor overload. This should be 0.2 A above the rated current on the heater data plate. See *Page 11, Figure 4.4*. The belt tension and alignment should also be checked and adjusted as shown on *Page 52, Figure 23*.

### 10.1.7 Mechanical Checks

1. Check that the flue is installed in accordance with these instructions and local regulations.
2. Check that the settings of the Combination Fan/Limit thermostat are correct - See *Page 41, Figure 17*.

**Figure 17: Combination Thermostat (all models)**



### 10.1.8 Burner (gas heaters)

Two-stage (High/Low) burners have additional specific requirements. Follow the manufacturer's instructions, the data provided on *Page 11, Section 4.4 through Page 13, Section 4.7*, and the commissioning instructions on *Page 43, Section 10.3*.

### 10.1.9 Gas Supply

All aspects of the gas installation, including the gas meter, must be inspected, tested for soundness and purged in accordance with local and national codes. Ensure that the air is fully purged from the heater inlet pipe up to the main gas valve inlet test nipple. Adjust the pressure switch located on the Dungs gas valve to 50% of its minimum inlet working pressure.

### 10.1.10 Before Operating the Heater

Ensure the burner head, air damper and pressure switch settings are adjusted for the correct burner in accordance with the Data Tables on *Page 11, Section 4.4 through Page 14, Section 4.8* (see the burner reference letter on data plate).

To ensure that all the controls are in safe working order, operate the heater for the first time with the isolating gas valve turned off.

1. Turn off the gas isolating valve
2. Using the installed external control, turn on the burner. The automatic sequence will now begin as described on *Page 43, Figure 18*.

There will be no ignition of the burner and lockout will occur, which proves the controls are operating correctly.

### 10.2 Commissioning the Single Stage Burner (gas heaters)

Follow the manufacturer's instructions and the data provided on *Page 11, Section 4.4 through Page 14, Section 4.8*.



### 10.2.1 Fire the Burner for Dungs Combination Gas Valves

1. Open the gas isolating valve.
2. Connect a suitable pressure gauge to the burner pressure test point.
3. Reset the lockout button of the control box and the burner should now fire. If lockout should occur when the main gas valve energises, repeat 3 or 4 times. If after several attempts the burner does not fire, then turn the main gas governor adjusting screw 3 turns clockwise. See *Page 41, Section 10.2* and repeat until the burner fires.

### 10.2.2 Set Gas Rate

1. Switch on again and allow the burner to fire and to settle for a few minutes.
2. Adjust the main gas burner pressure to the value given in the relevant Data Table for the model concerned using the Main Gas Regulator (accessed under the swivel cover).

The results of setting the gas flow rate by using burner pressure only can lead to quite wide variations in heat input due to the nature of the burners used.

**NOTE:** If the correct burner pressure cannot be reached, then check the inlet pressure to the valve, with the burner firing. See Technical Data Tables on *Page 11, Section 4.5* for inlet pressure requirements.

**Do not continue to adjust the regulator if the pressure is not changing.**

If the inlet pressure is too low to allow the correct burner pressure setting, then the gas inlet pressure must be corrected before completing the commissioning.

### 10.2.3 Check Gas Rate

It is important to check that the gas rate set during the commissioning is within  $\pm 5\%$  of the required flow rate.

This may be achieved by checking the gas flow to the heater wherever possible by using the gas meter and timing the flow through the meter. The results should be compared with the required flow rate for the model given in the Data Tables, adjusting the burner pressure to correct for any error. Checking the gas rate must be carried out with all other appliances including any pilots, turned off.

1. After burner pressure adjustment, allow the heater to operate for at least 15 minutes and then re-check settings.
2. Remove the manometer and refit all covers to the valve and tighten the screw of the outlet pressure tap.
3. Check gas flow rate at gas meter.

### 10.2.4 Control - Gas-Fired Heaters

Refer to the burner manufacturers instructions for further detail. Gas burners have two pressure switches, one is configured to cover combustion air and reaction to increases in combustion chamber pressures. The second pressure switch is used for monitoring the incoming gas supply pressure. **NOTE:** The low gas pressure switch should be set at 50% of the recorded inlet working gas pressure.

### 10.2.5 Description of Gas-Fired Heater Control

The gas-fired burner fitted to all cabinet heaters is controlled by a full sequence plug-in control. This control ensures the safe start and stop sequence and also monitors the safe presence of a flame and burner air pressure.

### 10.2.6 Sequence of Operation - Single Stage Burner

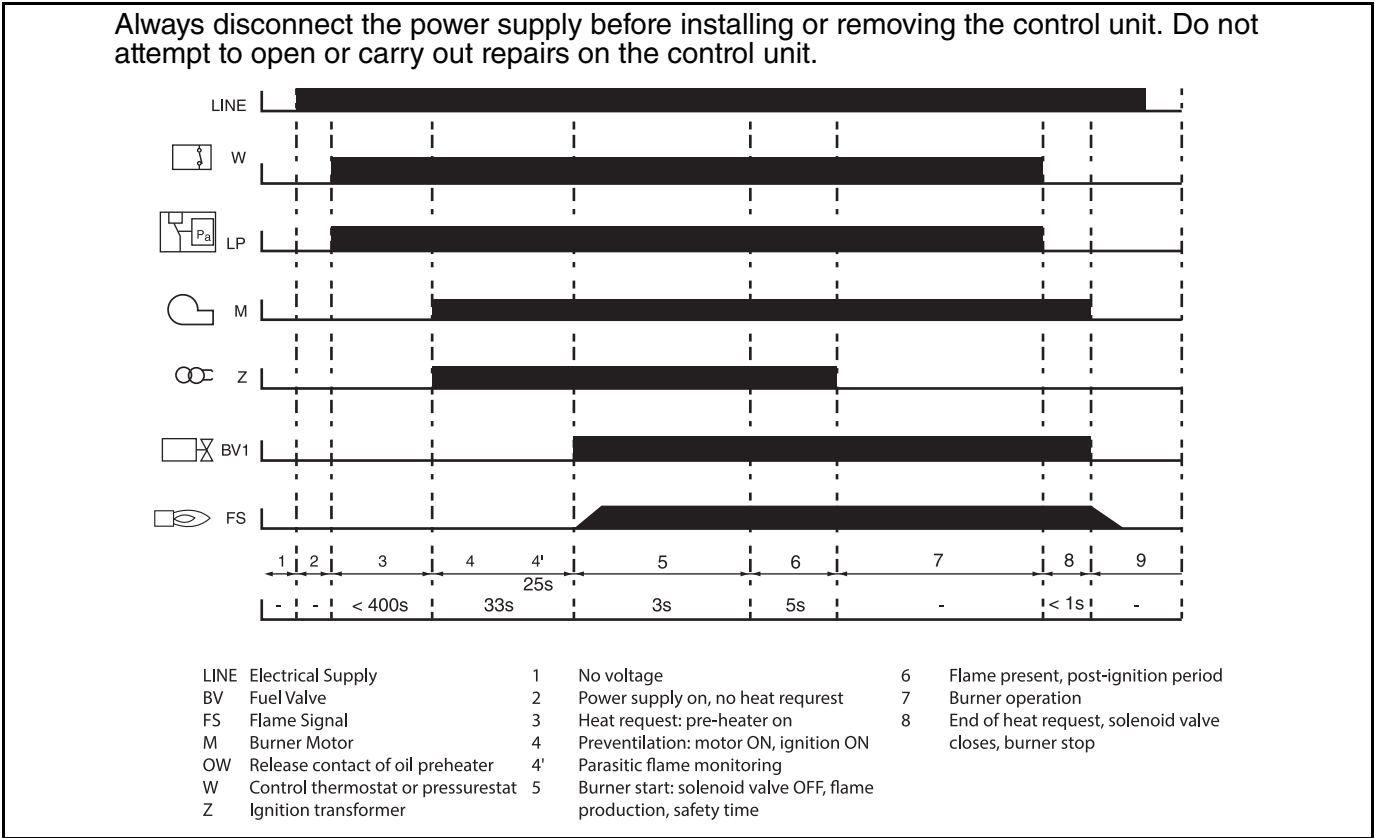
1. With the external controls on calling for heat, and the pressure switch at rest, the burner fan will switch on after the control does a "self check".

**NOTE:** If the pressure switch contacts (normally closed) are open, the heater will not start.

2. The combustion air fan turns on and the pressure switch contacts close within the next 5 seconds to indicate sufficient combustion air or lockout will occur.
3. The sequence continues with a purge period with the burner fan running.
4. The electrical ignition switches ON at the end of the purge period.
5. The main gas valve opens and once a flame has been established, this remains open until close down. The flame probe is now continuously monitoring for the safe presence of flame.
6. Three seconds later, the electric ignition turns off, leaving the gas flame to be proved as stable.
7. The control is now in its normal run position.
8. If the flue becomes blocked during the units operation, the unit will deactivate and the lock-out indicator light will activate.



Figure 18: Gas-Fired Heater Control Box Sequence



10.3 Commissioning the Two-Stage (High/Low) Burner (gas heaters)

High/Low burners have additional specific requirements. Follow the burner manufacturer's instructions and the data provided on Page 11, Section 4.4 through Page 14, Section 4.8.

10.3.1 Set Gas Rate

1. Switch off and refit the main gas valve plug (removed earlier to allow the main gas valve to operate).
2. Switch on again and allow the burner to fire and to settle for a few minutes.
3. Adjust the main gas burner pressure to the value given in the relevant Data Table for the model concerned using the Main Gas Regulator (accessed under the swivel cover).

The results of setting the gas flow rate by using burner pressure only can lead to quite wide variations in heat input due to the nature of the burners used.

**NOTE:** If the correct burner pressure cannot be reached, then check the inlet pressure to the valve, with the burner firing. See Technical Data Tables on Page 11, Section 4.5 for inlet pressure requirements.

**Do not continue to adjust the regulator if the pressure is not changing.**

If the inlet pressure is too low to allow the correct burner pressure setting, then the gas inlet pressure must be corrected before completing the commissioning.

10.3.2 Check Gas Rate

It is important to check that the gas rate set during the commissioning is within  $\pm 5\%$  of the required flow rate.

This may be achieved by checking the gas flow to the heater wherever possible by using the gas meter and timing the flow through the meter. The results should be compared with the required flow rate for the model given in the Data Tables, adjusting the burner pressure to correct for any error. Checking the gas rate must be carried out with all other appliances including any pilots, turned off.

1. After burner pressure adjustment, allow the heater to operate for at least 15 minutes and then re-check settings.
2. Remove the manometer and refit all covers to the valve and tighten the screw of the outlet pressure tap.
3. Check gas flow rate at gas meter.

10.3.3 Control - Gas-Fired Heaters

For High/Low, follow the general sequence as described below and also have extra functional stages related to air damper positions. Refer to the burner manufacturers instructions for further detail. Gas burners have two pressure switches; One is configured to cover combustion air and reaction to increases in combustion chamber pressure. The second pressure switch is used for monitoring incoming gas supply pressure.

10.3.4 Description of Gas-Fired Heater Control

The gas-fired burner fitted to all cabinet heaters is controlled by a full sequence plug-in control. This

control ensures the safe start and stop sequence and also monitors the safe presence of a flame and burner air pressure.

### 10.3.5 Sequence of Operation - Two-Stage Burner

1. With the external controls on calling for heat, and the pressure switch at rest, the burner fan will switch on after the control does a "self check".

**NOTE:** If the pressure switch contacts (normally closed) are open, the heater will not start.

2. The combustion air fan turns on and the pressure switch contacts close within the next 5 seconds to indicate sufficient combustion air or lockout will occur.
3. The sequence continues with a purge period with the burner fan running.
4. The electrical ignition switches ON at the end of the purge period.
5. The main gas valve opens and once a flame has been established, this remains open until close down. The flame probe is now continuously monitoring for the safe presence of flame.
6. Three seconds later, the electric ignition turns off, leaving the gas flame to be proved as stable.
7. The control is now in its normal run position.
8. If the flue becomes blocked during the units operation, the unit will deactivate and the lock-out indicator light will activate.

After setting the minimum burner input and combustion, the following check must be made: Run the heater on low fire for a minimum of 15 minutes. Check the flue gas temperature. If the flue

gas temperature falls below 125° C, increase the low fire gas setting until the temperature reaches 125° C, otherwise condensation may form.

### 10.4 Motor Starter and Thermal Overload

On belt-driven models, the motor is controlled by a direct on-line contactor starter fitted with thermal overload protection. If the thermal overload operates, the main fan will not run. To reset, press the reset button on the overload unit.

**NOTE:** For models with a 5.5 kW motor or larger, the direct on-line starter will be replaced by an automatic starter.

The overload should be set to indicate approximately 0.2 A above the normal running current of the heater. See Page 11, Section 4.4.

#### 10.4.1 Burners

For details of the packaged burners, see the manufacturer's instructions and Page 11, Section 4.5 through Page 14, Section 4.8. When reading the data tables, ensure that the correct table for the burner and gas valve installed is being used. The data tables are listed under a burner reference letter which can be found on the heater data plate.

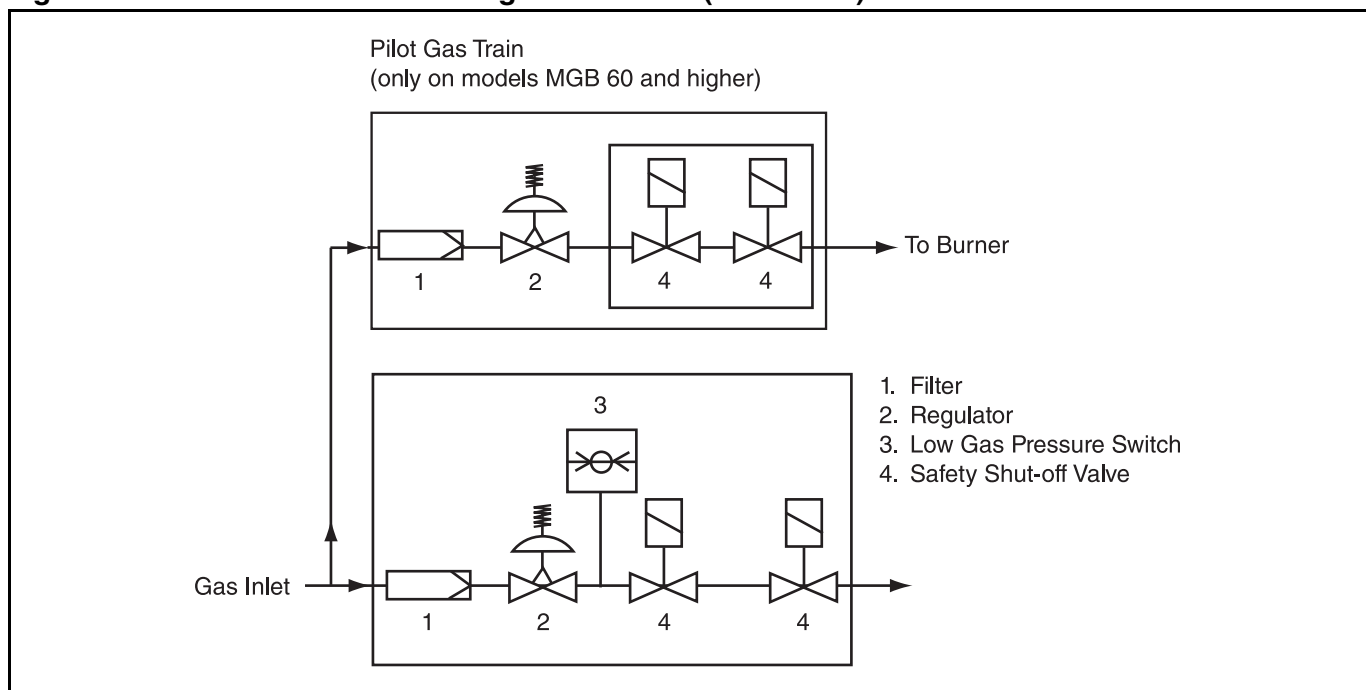
### 10.5 Gas Valves

#### Dungs Combination Gas Valve

All model 015 - 030 gas-fired burners operate as direct main flame ignition and have no separate start gas train. All other models operate with a first stage start gas flame supplied from a start gas train containing a start gas pressure regulator and two safety shut-off valves, for all gas types.

The main gas is released at the second stage, and the combination main gas valve block contains a main burner pressure regulator and two safety shutoff valves, for all gas types. See Page 44, Figure 19. Please refer to the manufacturer's instructions for setting the controls.

**Figure 19: Gas Train Circuit for Dungs Gas Valves (all models)**



### 10.5.1 Main Gas Valves

Refer to the relevant Ecoflam burner and gas train installation manuals supplied with your heater for the position of the burner pressure regulator. This must be used to set the burner pressure indicated in the data tables in *Section 4*.

For two-stage, the Dungs gas valve, please refer to the burner manufacturer's instructions for setting the controls.

### 10.5.2 Throughput Adjuster

These valves have a throughput adjuster fitted to the second main gas valve. Refer to the relevant Ecoflam burner and gas train installation manuals, supplied with your heater. When replacing a gas valve, ensure that this device is set in the fully open position by releasing the locking screw and turning the "V MAX" fully counterclockwise towards the "+" and then retightening the locking screw.

### 10.5.3 Rate of Opening

This device is a hydraulic damper which slows down the rate of opening of the second main gas valve to give a smooth main gas ignition. This is preset at the factory at the slowest setting and will need no further adjustment. If a new valve is fitted, then remove the plastic screw on top and with a small screwdriver turn the "V Start" screw fully clockwise towards the "-" and refit the plastic cover.

### 10.6 Combustion Testing (all models)

Combustion quality must be tested to prove correct heater operation. Incorrect results will indicate faults with the installation or appliance.

Combustion testing must be carried out with all covers in place. The flue gas is sampled in the flue, within 1 meter of the heater. The values of CO<sub>2</sub> should be between 9.5% and 10.0% for natural gas and 11% for LPG, depending upon the model.

The CO will be up to 80 ppm (0.008%) dry, air free, depending upon the model. Temperature rise of the flue gases above ambient should be approximately 160°C to 180°C. Seal the sample test hole in the flue after testing.

To alter combustion performance, open/close the combustion air damper to reduce or increase these values. Once adjusted to the optimum combustion setting, lock the air damper into position.

Repeat the steps on *Page 42, Section 10.2.3*.

#### 10.6.1 Pressure Switch

**Setting of the pressure switch must only be carried out as part of a complete commission which includes combustion testing. For adjusting the air pressure switch, see Ecoflam instructions.**

#### 10.6.2 Complete the Commissioning

Ensure that all covers are fitted correctly and all test points are properly sealed.

### 10.7 Commissioning the Burner (Oil Heaters)

Check all valves between the fuel tank and the heater are open, including the fire valve.

Ensure that oil is available at the heater inlet and that the air has been vented from the fuel pipe installation. Vent the air by opening the bleed screw on top of the fuel filter. On pressurised systems, check that the installation is running at the correct pressure. B.M. oil lifters will need priming.

#### 10.7.1 Burner Settings

Ensure that the burner head and air damper settings are adjusted for the correct burner and that the correct atomising nozzle is fitted. See *Page 13, Section 4.7* and the burner reference number on the data plate.

#### 10.7.2 Preparation for Burner Pressure Test

Attach a pressure gauge 0-15 BAR (0 - 200 psi) to the burner pump pressure test port. (See manufacturer's information). A test manifold gives you the facility for the connection of the pressure gauge and the venting of the pump.

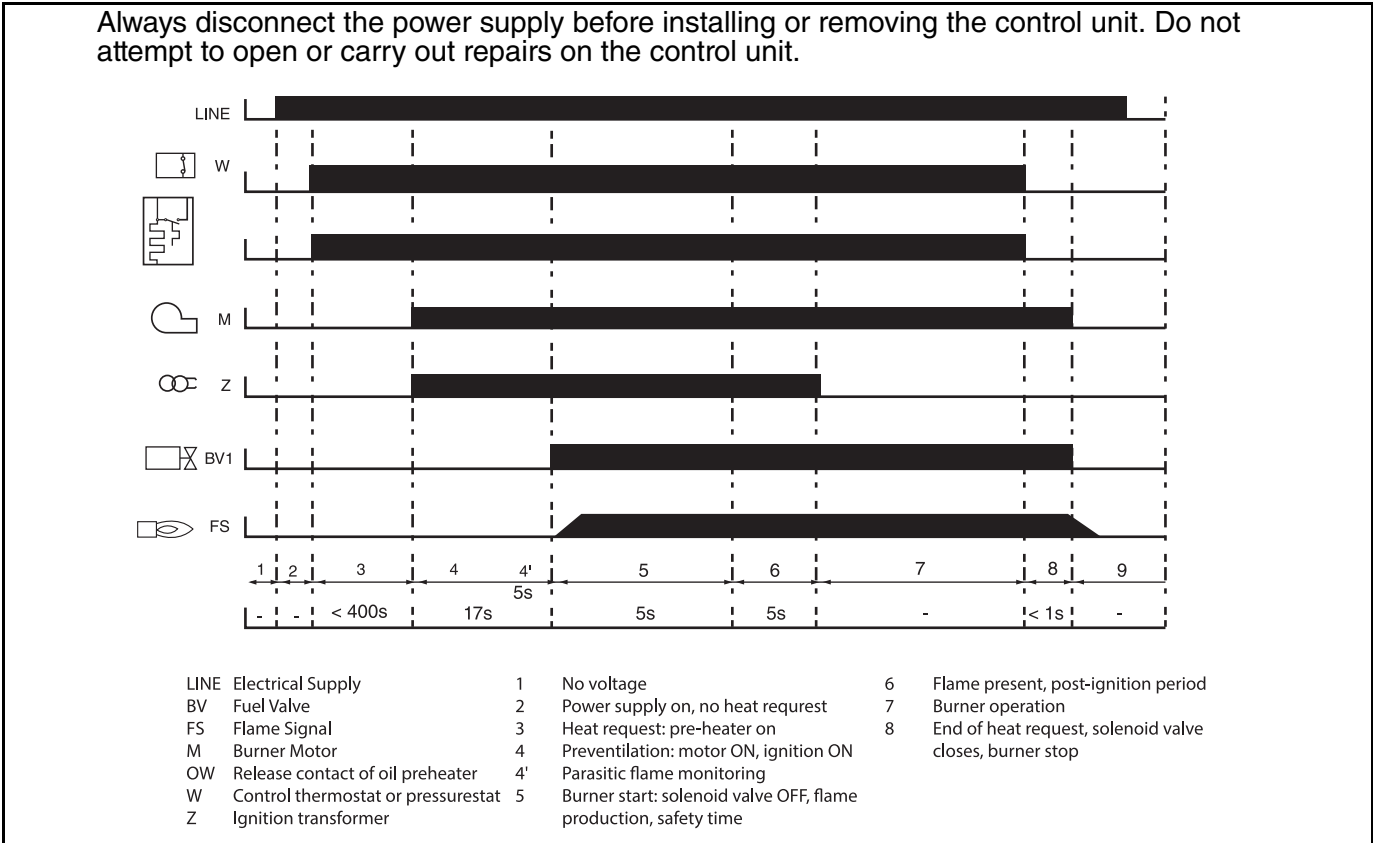
### 10.8 Control - Oil-Fired Heaters

For High/Low oil burners, follow the general sequence as described below and also have extra functional stages related to air damper positions. Refer to the burner manufacturer's instructions for further detail.

#### 10.8.1 Description of Oil Fired Heater Control

The oil fired burners fitted to the heater are controlled by a fully automatic control and photoelectric flame monitor unit. This control ensures the safe start, ignition and stop sequence and also monitors the flame. If the flame should fail the control will go into "lockout". The button on the front of the control will illuminate to indicate lockout. Press the button to reset the control to restart the burner firing cycle.

Figure 20: Oil-Fired Heaters Control Box Sequence



10.8.2 Sequence of Operation

The operating sequence is as follows:  
With the external controls on and calling for heat, the burner fan and electric ignition will switch on. After a combustion air purge of approximately twelve seconds, the oil solenoid valve will open and the burner will fire. After another five seconds, the electric ignition is turned off and the burner will go into its normal run position. The photo cell continuously monitors the safe presence of the flame. When the temperature control is satisfied, the control box will turn off all its outputs simultaneously and return to the rest position for the beginning of the next sequence.

10.8.3 Fault Conditions

If at any stage during normal running the photo electric cell fails to detect the flame, the control will switch off and make an instant restart attempt. If the flame signal is still missing, "lockout" will occur. If the flame is not detected by the photo cell during a normal start, there will be no restart attempt and "lockout" will occur in approximately 17 seconds after the start.  
If a flame is detected during the first 12 seconds (purge), the solenoid valve will not open and the control will "lockout". For the control sequence, see Page 46, Figure 20.

10.8.4 Switching On

Turn on the heater with the external controls. (Heat ON). If the "Lockout Reset" button is illuminated, press to reset. The combustion air fan and electric ignition should work immediately. Vent the burner oil pump at the same time by loosening the pump vent port (pump must be running). If the burner goes into "lockout" before the pump has vented, wait one

minute, then reset the control box and repeat Section 10.8.4 until all the air has been vented from the pump and the burner fires.  
**NOTE:** The burner plug and socket may be used to turn off the burner during commissioning.

10.8.5 Blocked Flue

A safety device which measures the combustion chamber and flue is fitted on this heater. If the pressure exceeds the factory set maximum pressure limit, the heater will fail safe and prevent the burner from firing. In the event of this happening one indicator lamp located on the front of the heater will be illuminated - This fault should be investigated by a competent person.

10.8.6 Adjust Burner Oil Pressure

Adjust the burner oil pressure to the value in the data table for the burner reference letter and burner manufacturer's information for details of the burner oil pump. When completed, turn off burner and remove test gauge and refit plug.

10.8.7 Set Combustion Air

The combustion air must be set. Measure the emissions in the flue at a point within one metre from the outlet of the heater and adjust for the highest carbon dioxide (CO<sub>2</sub>) levels obtainable, usually 10.5 - 11.0%, while making little or no smoke (smoke number 0-1). The test must be carried out with all covers fitted and after the heater has been running for 15 minutes.

10.8.8 Complete the Commissioning

Test the burner for correct start and stop operation several times. Check that all safety devices operate

correctly. Inspect the heater for any oil leaks and repair where necessary.

### **10.9 Turning Off the Heater (all models)**

Set the external controls to the "off" position and the main burner will stop. The fans will run until they are stopped automatically by the fan thermostat.

**Do not use Electrical Isolator for control of heater. The Electrical Isolator will switch off the fan. The heat exchanger could be damaged. The Warranty will not cover damage to the heat exchanger if operated improperly.**

### **10.10 External Controls**

External controls may include a time switch, room thermostat and frost thermostat. Operate each control to ensure that they function correctly. Set the time switch (if fitted) and room thermostat to the user's requirements.

### **10.11 Instruction to the User**

Explain the controls of the heater to the user, including how to turn it on and off, using the controls fitted on site.

Give this manual to the user.

Ensure that the user is shown and understands the importance of maintaining clearances to combustibles; the user instructions *on Page 48, Section 11 through Page 49, Section 11.4*; and all warnings defined in this manual.

SECTION 11: USER INSTRUCTIONS

⚠️ DANGER




Electrical Shock Hazard

Disconnect electric before service.

Heater must be properly grounded.

Failure to follow these instructions can result in death or electrical shock.


⚠️ WARNING



Fire Hazard


Keep all flammable objects, liquids and vapors the minimum required clearances to combustibles away from heater.

Some objects will catch fire or explode when placed close to heater.



Explosion Hazard


Turn off gas supply to heater before service.



Burn Hazard

Allow heater to cool before service.

Tubing may still be hot after operation.



Cut/Pinch Hazard

Wear protective gear during installation, operation and service.

Edges are sharp.

Failure to follow these instructions can result in death, injury or property damage.

11.1 User Instructions

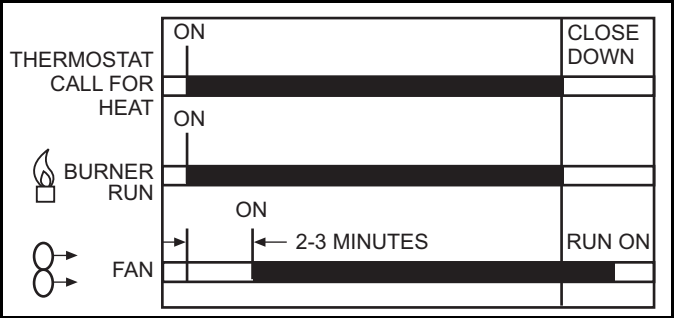
The Cabinet heaters are fully automatic and operate from the external controls fitted on site.  
The only user controls at the heater are the:  
Fan Run Button - See Page 49, Figure 22.  
Over heat lockout reset button - See Page 49, Section 11.2.2.  
Limit thermostat reset button - See Page 49, Figure 22.

11.1.1 Heater Operation

When the heater has been switched on by the remote controls installed on site, the main burner will automatically turn on. The burner control will control the safe ignition of the flame. When the heat exchanger is sufficiently heated, the fan thermostat turns on the main fan(s).  
All heaters require a constant gas and electricity supply, which must not be interrupted during the normal operation of this heater.

**NOTE:** The fan will come on during burner firing for horizontally mounted and high-flow heaters.

Figure 21: Heater Operating Sequence



Event	State	Duration
THERMOSTAT CALL FOR HEAT	ON	
BURNER RUN	ON	
FAN	ON	2-3 MINUTES
CLOSE DOWN		
RUN ON		

11.1.2 Heater Operation (high/low)

The heater will operate as described in Section 11.1.1 with these added features:

High/Low Operation

A second limit thermostat or a two-stage thermostat will be installed on site so that as the temperature

48 of 85



reaches the first set point, the firing rate will reduce to low fire. If the temperature rises to the second set point, the burner will turn off. The burner will come on again at either High or Low fire, depending on the thermostat set point.  
Set the two stage thermostat to the desired temperature.

11.2 Common User Controls (all models)

11.2.1 Combination Fan/Limit Thermostat

The Combination Fan/Limit Thermostat is located at the top right side of the heater.

This control ensures the heater does not blow cold air in the normal heating cycle and protects the heat exchanger against overheating.

Figure 22: Fan/Limit Thermostat

If the air flow is reduced due to power failure, the limit thermostat will cause the burner to lockout.

Red limit reset button  
(Press to reset)

White fan button

Pull out for normal operation.  
Press in for constant fan.

The combination fan/limit thermostat is preset during commissioning.  
See Page 11, Section 4.4 and Page 41, Figure 17.

**NOTE:** To reset, the heat exchanger must be cool.

Description	Part Number
Combination Fan/Limit Thermostat	K017A

**⚠ WARNING**

**Explosion Hazard**

If control locks out, do not make more than 3 attempts to restart the heater.

Dangerous fuel mixtures can build up.

The fault must be traced and repaired by a registered installer or service engineer.

Failure to follow these instructions can result in death, injury or property damage.

11.2.2 Burner Lockout Reset Button

The red warning light built into the burner control box will illuminate when the control has gone to lockout. This may be caused by flame failure. Wait one minute then press the reset button.

11.3 Lighting Instructions (all models)

11.3.1 To Turn On Heater

1. Ensure that the electrical and gas supplies to the heater are on. Check that the on-site controls are “ON”.

**NOTE:** The thermostat setting must be above the ambient temperature for the heater to operate.

2. The automatic firing sequence will begin as described on Page 48, Figure 21. The heater will now operate automatically under the control of the on-site controls. Following long shut down periods, the control may go to lockout. See Page 49, Section 11.2.2.

11.3.2 To Turn the Heater Off

Set the installed remote controls to the “OFF” position or turn down the remote thermostat below the ambient temperature.  
The burner will turn off immediately.  
The fan will continue to run for a few minutes.  
To restart, turn the remote control to “ON”.

If the heater will remain off for a long period of time, when the main fan(s) have stopped, turn off the fuel supply valve and main electrical isolator. To restart open the fuel supply valve and follow the instructions in Section 11.3.1.

11.4 Simple Fault Finding (all models)

Some possible reasons for the heater not operating are:

1. Gas supply not turned ON.
2. Electricity supply not turned ON.
3. The time and/or temperature controls are not ON.
4. The Limit Thermostat may have operated. This may be caused by an interruption of the electrical supply or failure of the distribution fan.
5. The burner supply plug has been disconnected.

If the Limit Thermostat persistently operates, there is a fault which must be investigated by a contractor qualified in the installation and service of gas or oil-fired heating equipment.

**NOTE:** If the main fan runs continuously, the white button (Page 49, Figure 22) may have been pressed in - make sure it is pulled out. Alternatively, if a remote fan switch is fitted it may be in the ON position.

#### **11.4.1 Simple Fault Finding (burner faults)**

If the burner fails to ignite for any reason, it will go to lockout. This will be indicated by the red light on the heater or at the remote indicator (if fitted).

1. Press in and release the lockout reset button on the burner or, if fitted, the remote reset.

Lockout should not occur during normal operation of the heater and indicates there is a fault condition which must be corrected.

#### **11.4.2 Simple Fault Finding (oil fired heaters)**



Make sure the appliance fuel valve is open and there is oil in the tank. If the fuel tank or lines have run dry, the fuel system will need to be vented. For venting oil-fired heaters, *See Page 45, Section 10.7 through Section 10.8.4.*




#### **11.4.3 Blocked Flue**

If lockout lamp is illuminated call registered installer to verify. *See Page 46, Section 10.8.5.*



## SECTION 12: SERVICING

<b>⚠ DANGER</b>	
	
<b>Electrical Shock Hazard</b> <b>Disconnect electric before service.</b>  <b>More than one disconnect switch may be required to disconnect electric from equipment.</b>  <b>Equipment must be properly grounded.</b>	<b>Severe Injury Hazard</b> <b>Do not enter equipment while in operation.</b>  <b>Equipment may start automatically.</b>  <b>Do not operate with door open.</b>  <b>Installation, operation and service must be done by a trained technician only.</b>
<b>Failure to follow these instructions can result in death, electrical shock or injury.</b>	

<b>⚠ WARNING</b>		
		
<b>Explosion Hazard</b> <b>Leak test all components of equipment gas piping before operation.</b>  <b>Gas can leak if piping is not installed properly.</b>  <b>Do not high pressure test gas piping with equipment connected.</b>	<b>Falling Hazard</b> <b>Use proper safety equipment and practices to avoid falling.</b>  <b>Do not use any part of equipment as support.</b>	<b>Burn Hazard</b> <b>Allow equipment to cool before service.</b>  <b>Internal components of equipment may still be hot after operation.</b>
<b>Failure to follow these instructions can result in death, injury or property damage.</b>		

**12.1 Servicing Instructions**

After commissioning, the heater will require maintenance to be carried out annually. If the heater is used in a dirty or dusty area, more frequent maintenance may be necessary.

Installation, Service and Annual Inspection of the heater must be done by a contractor qualified in the installation and service of gas or oil-fired heating equipment.

**NOTE 1:** After any maintenance or repair work, always test fire the heater in accordance with the commissioning instructions *on Page 40, Section 10 through Page 47, Section 10.11* to ensure all safety systems are in working order before leaving the heater to operate. Minor faults may be traced by using the troubleshooting charts *on Page 56, Section 14 through Page 62, Section 14.7*.

**NOTE 2:** Check all fuel pipes and pipe joints to ensure there are no cracks or gas leaks. Any cracks in the pipes or pipe joints must be repaired.

**NOTE 3:** Inspect all suspended components and hardware. Insure that they are in good condition, properly tightened, and corrosion free.

**12.2 Burner Maintenance**

1. See the manufacturer's information for specific instructions.
2. Clean the fan (and fuel filters, when fitted). Inspect all components, including the flame monitoring and ignition system, and correct operation of fuel control valves.

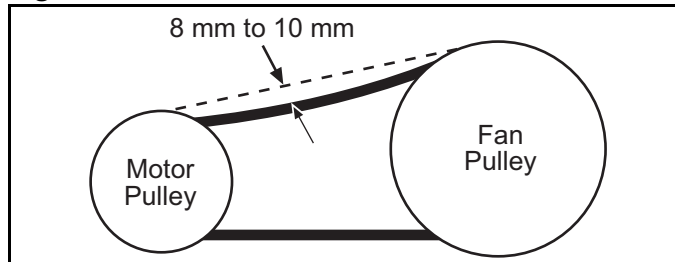
3. For oil-fired burners it is recommended that the atomising oil nozzle be replaced during the annual service.

should be sound, with the foil face in good condition. If any thermal insulation is in poor condition, then it must be replaced with new insulation material and suitably sealed at the edges with adhesive foil tape.

### 12.3 Fan/Motor Assembly Maintenance (all models)

The main fan bearings are permanently sealed and do not need lubrication. Before cleaning, turn off fuel and electrical supply. Remove the heater side panels and use a small brush or duster to clean the fan blades from each side. Replace panels when done.

**Figure 23: Belt Tension**



Check the condition and tension of the drive belts. The condition is best inspected with the belts removed. Check for chaffing or lateral cracks. Replace belts as a matched pair as necessary. Do not over-tighten belts, as this may cause bearing damage.

### 12.4 Heat Exchanger Maintenance

Ensure that the front collector box is clean and that the turbulators fitted to the tubes are in good condition.

Also inspect the joint between the heat exchanger and the flue to ensure that it is still sealed.

1. If maintenance is needed, remove the burner.  
*See Page 63, Section 15.1.*
2. Remove the upper front panel.
3. Remove the front cover of the heat exchanger.
4. Remove and inspect the turbulators.
5. Clean out any deposits from flue ways and the combustion chamber, using a vacuum cleaner and brush. Inspect the combustion chamber and heat exchanger for damage or corrosion.
6. Any damage must be referred to Roberts-Gordon Europe Limited.
7. Replace components in reverse order to above - replacing gasket material and any damaged turbulators.
8. Inspect and repair any damage to the seal between the flue and the flue spigot.

### 12.5 Thermal Insulation

While the upper panels are removed for heat exchanger servicing, the thermal insulation fitted to all the upper panels must be inspected. Insulation

## 12.6 Maintenance Checklist

**Installation Code and Annual Inspections:** All installation and service of ROBERTS GORDON® equipment must be performed by a contractor qualified in the installation and service equipment sold and supplied by Roberts-Gordon Europe Limited and conform to all requirements set forth in the ROBERTS GORDON® manuals and all applicable governmental authorities pertaining to the installation, service, operation and labeling of the equipment.

To help facilitate optimum performance and safety, Roberts-Gordon Europe Limited recommends that a qualified contractor conduct, at a minimum, annual inspections of your ROBERTS GORDON® equipment and perform service where necessary, using only replacement parts sold and supplied by Roberts-Gordon Europe Limited.

<b>The Vicinity of the Heater</b>	<p>Do not store or use flammable objects, liquids or vapors near the heater. Immediately remove these items if they are present.</p> <p>Maintain the clearances to combustibles.</p> <p>Do not hang anything from, or place anything on, the heater.</p> <p>Immediately remove objects in violation of the clearances to combustibles.</p> <p><i>See Page 5, Section 3.</i></p>
<b>Flue Pipe/Terminals</b>	<p>Flueing must be intact. Using a torch, look for obstructions, cracks on the pipe, gaps in the sealed areas or corrosion.</p> <p>The area must be free of dirt and dust.</p> <p>Remove any carbon deposits or scale using a wire brush.</p> <p>If the vent terminal has a screen built in, remove any dirt, dust or deposits from the screen.</p> <p><i>See Page 22, Section 7.</i></p>
<b>Combustion Air Intake Pipe</b>	<p>Intake pipe and inlet must be intact. Look for obstructions, cracks on the pipe, gaps in the sealed areas or corrosion.</p> <p>The area must be free of dirt and dust.</p> <p>Clean and reinstall as required.</p>
<b>Heat Exchanger</b>	<p>Make sure there are no cracks.</p> <p>Make sure there is no sagging, bending or distortion.</p> <p>Clean or replace as required.</p> <p><i>See Page 23, Section 8.</i></p>
<b>Fuel Line and Shut-off Valves</b>	<p>Check for gas leaks.</p> <p><i>See Page 23, Section 8.</i></p>
<b>Burner Observation Window</b>	<p>Make sure it is clean and free of cracks or holes.</p> <p>Clean and replace as required.</p>
<b>Flue Blower Scroll, Wheel and Motor</b>	<p>Compressed air or a vacuum cleaner may be used to clean dust and dirt.</p>
<b>Orifices</b>	<p>Clear obstructions (even spider webs will cause problems).</p> <p>Carefully remove any dust and debris from the burner.</p>

<b>Direct-Spark Igniter</b>	Replace if there are cracked ceramics, excessive carbon residue, or erosion of the electrode.  See burner manufacturer's instructions.
<b>Thermostat</b>	There should be no exposed wire or damage to the device or wiring.  <i>See Page 27, Section 9.</i>
<b>Support Points</b>	Make sure the heater is properly supported.  Make sure the heater is placed on a firm, level, non-combustible surface that can support its weight. <i>See Page 8, Section 4.1.</i>
<b>Silicone Tubing</b>	Ensure tight, secure fit on all pressure fittings at pressure switch, burner partition, and blower outlet.
<b>Gas Valve</b>	Verify that cap covering pressure regulator adjustment screw is secure and has not been tampered with.  Verify all wiring connections.
<b>Condensate Drain (when installed)</b>	Flush drain and clear any obstructions.
<b>Ductwork</b>	Consult an indoor air quality professional for proper cleaning procedures
<b>Air Circulation Blower</b>	For a complete inspection, refer the manufacturers Installation, Operation and Service manual.
<b>Wall Plate</b>	If wall plate is present, make sure it is legible and accurate. Please contact Roberts-Gordon Europe Limited if you need a wall tag. <i>See Page 4, Section 2.1.</i>
<b>Safety Labels</b>	Product safety signs or labels should be replaced by the product user when they are no longer legible. Please contact Roberts-Gordon Europe Limited or your ROBERTS GORDON® independent distributor to obtain replacement signs or labels. <i>See Page 3, Figure 1.</i>

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## **SECTION 13: CONVERSION BETWEEN FUELS**

### **13.1 General**

All Cabinet heaters may be operated on fuel oil, natural gas or propane gas, depending on which burner type has been fitted. Any conversion between fuels must be done by a contractor qualified in the installation and service of gas or oil-fired heating equipment. Conversion must be carried out in accordance with the information provided to maintain compliance with the CE product certification.

### **13.2 Burner Conversion**

Burners designed to operate on class D (35 sec) fuel oil (Gas Oil) may be converted to operate on kerosine (28 sec). This may shorten the life expectancy of the fuel pump and fuel train components.

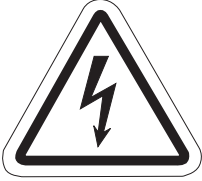

Burners designed to burn natural gas may be converted to burn LPG propane gas or vice versa.


For details of the changes necessary, please contact Roberts-Gordon Europe Limited with the heater serial number and burner type or consult the burner manufacturer's information.

Heaters designed to burn fuel oil may only be converted to burn gas by replacing the complete burner.

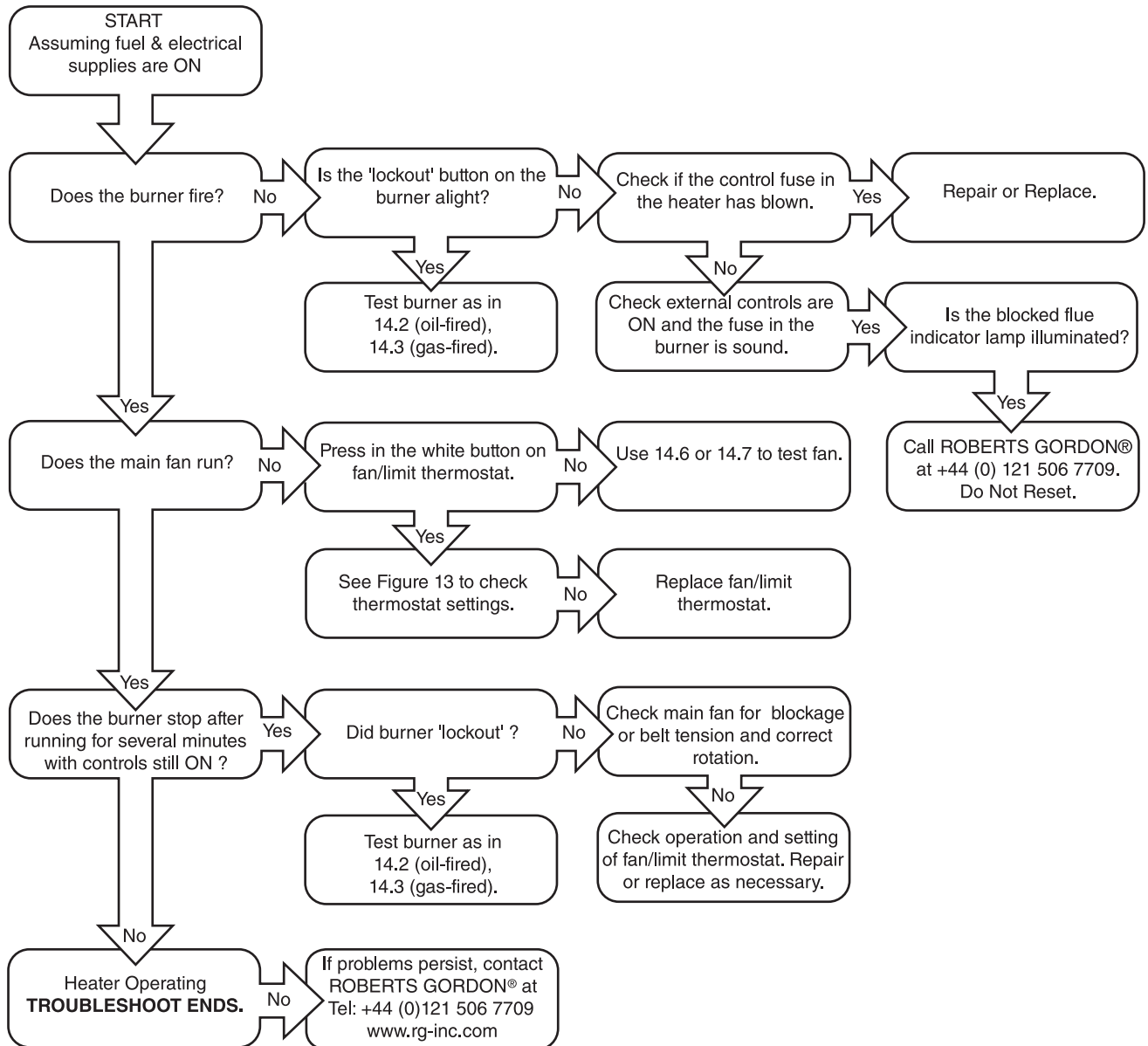
Heaters designed to burn gas may only be converted to burn fuel oil by replacing the complete burner.

## SECTION 14: TROUBLESHOOTING

<b>⚠ DANGER</b>	
	
<b>Electrical Shock Hazard</b> <b>Disconnect electric before service.</b>  <b>More than one disconnect switch may be required to disconnect electric from equipment.</b>  <b>Equipment must be properly grounded.</b>	<b>Severe Injury Hazard</b> <b>Do not enter equipment while in operation.</b>  <b>Equipment may start automatically.</b>  <b>Do not operate with door open.</b>  <b>Installation, operation and service must be done by a trained technician only.</b>
<b>Failure to follow these instructions can result in death, electrical shock or injury.</b>	

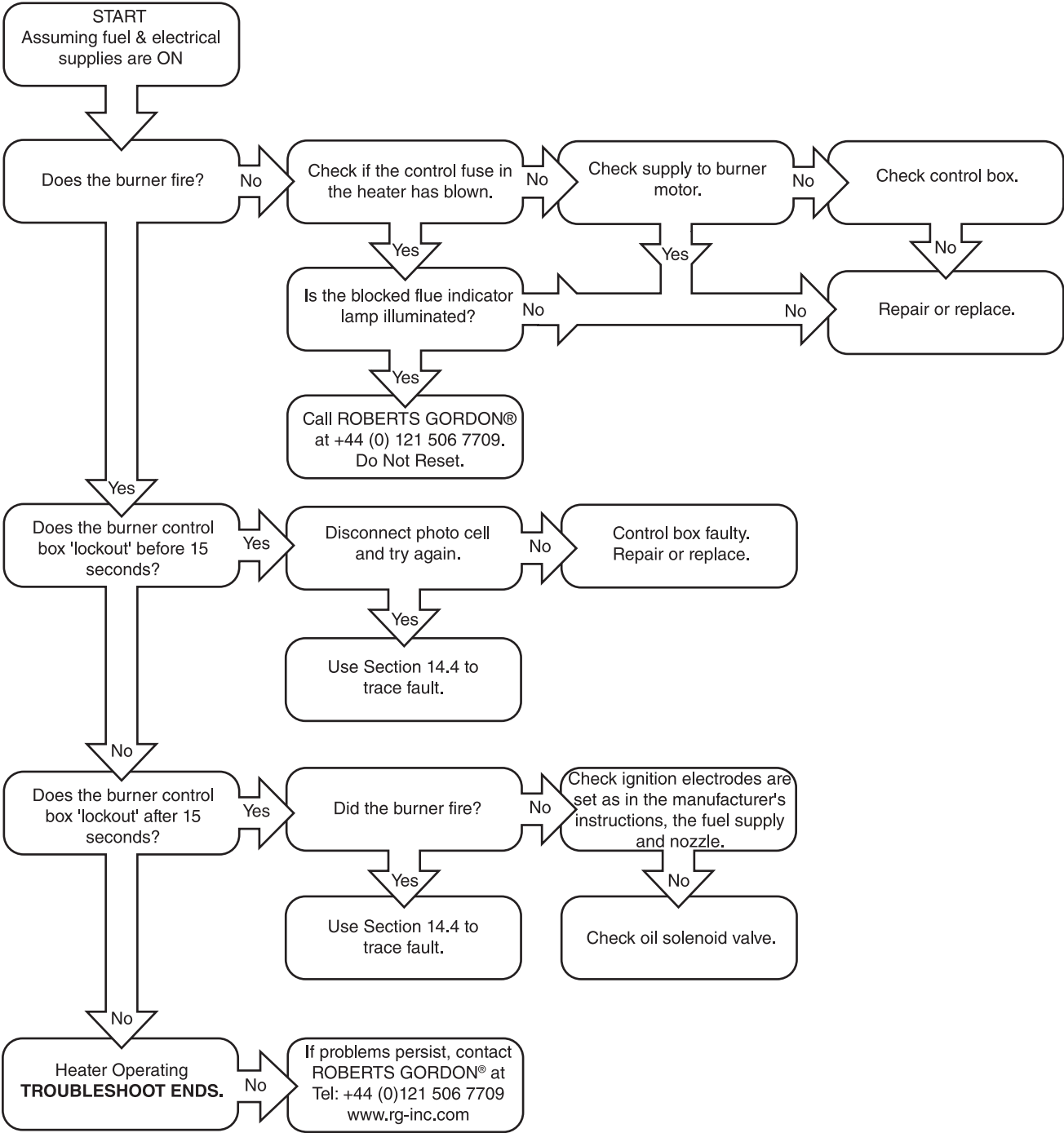
<b>⚠ WARNING</b>				
				
<b>Explosion Hazard</b> <b>Turn off gas supply to equipment before service.</b>	<b>Fire Hazard</b> <b>Keep all flammable objects, liquids and vapors the minimum required clearances to combustibles away from equipment.</b>  <b>Some objects will catch fire or explode when placed close to equipment.</b>	<b>Falling Hazard</b> <b>Use proper safety equipment and practices to avoid falling.</b>  <b>Do not use any part of equipment as support.</b>	<b>Burn Hazard</b> <b>Allow equipment to cool before service.</b>  <b>Internal components of equipment may still be hot after operation.</b>	<b>Cut/Pinch Hazard</b> <b>Wear protective gear during installation, operation and service.</b>  <b>Edges are sharp.</b>
<b>Failure to follow these instructions can result in death, injury or property damage.</b>				

## 14.1 General



Conduct Commissioning procedure as shown on Page 40, Section 10.

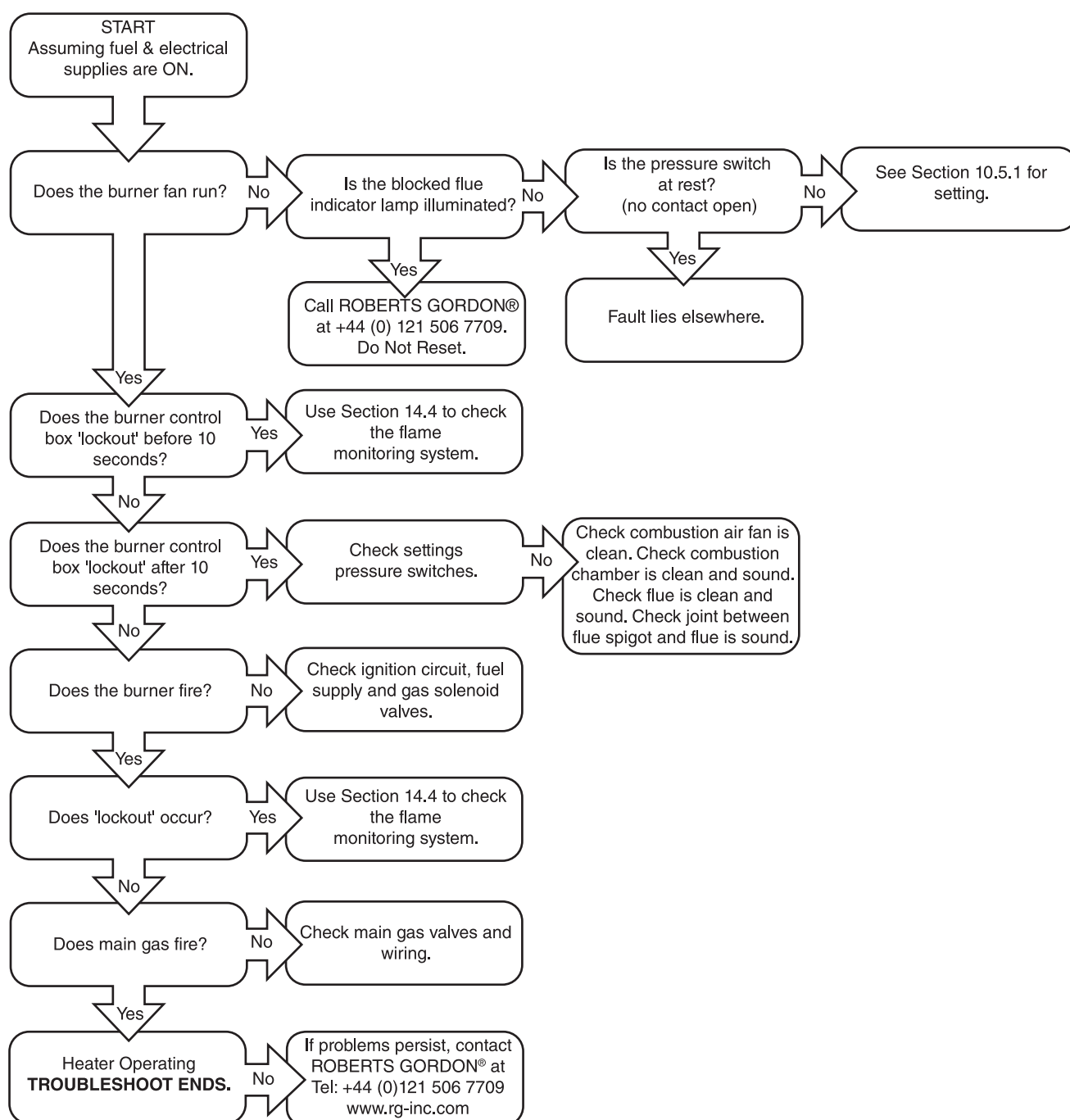
14.2 Troubleshooting for Oil Burners (see manufacture’s instructions)



Conduct Commissioning procedure as shown on *Page 40, Section 10.*



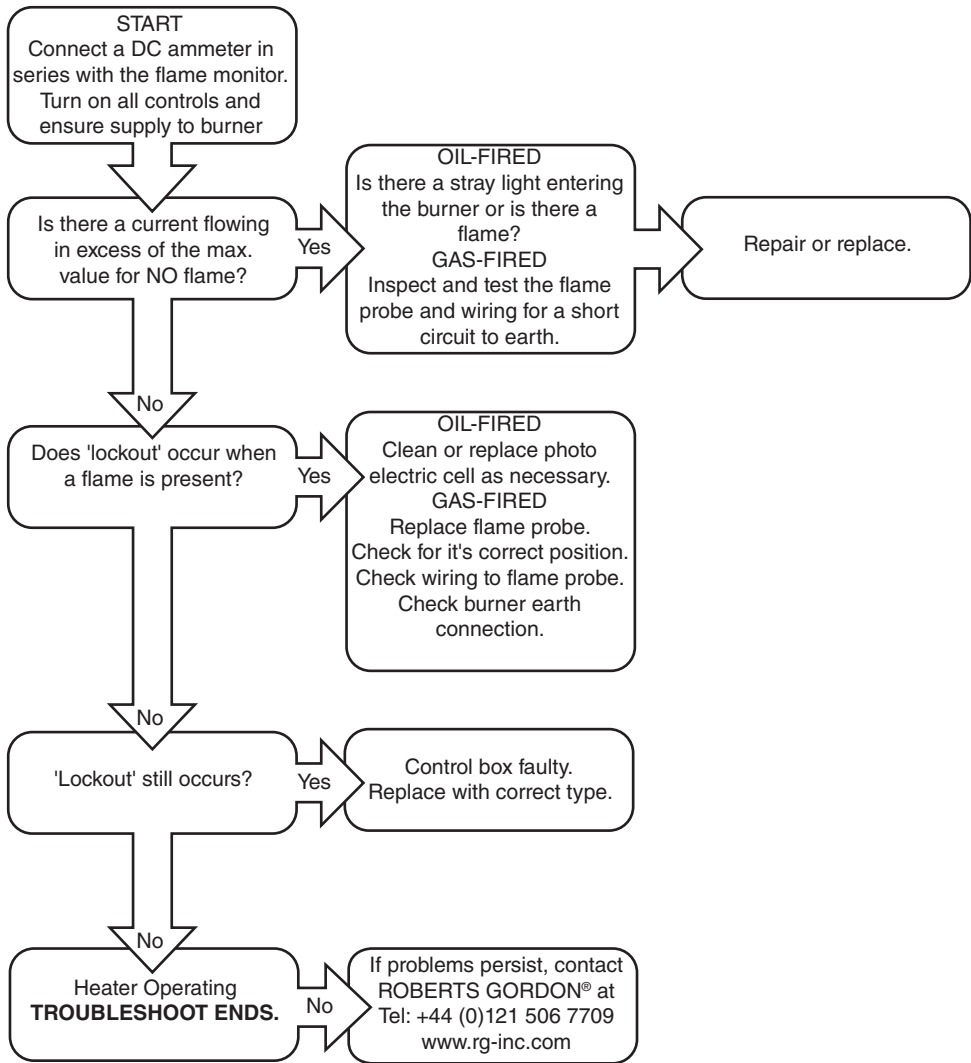
## 14.3 Troubleshooting for Gas Burners (see manufacturer's instructions)



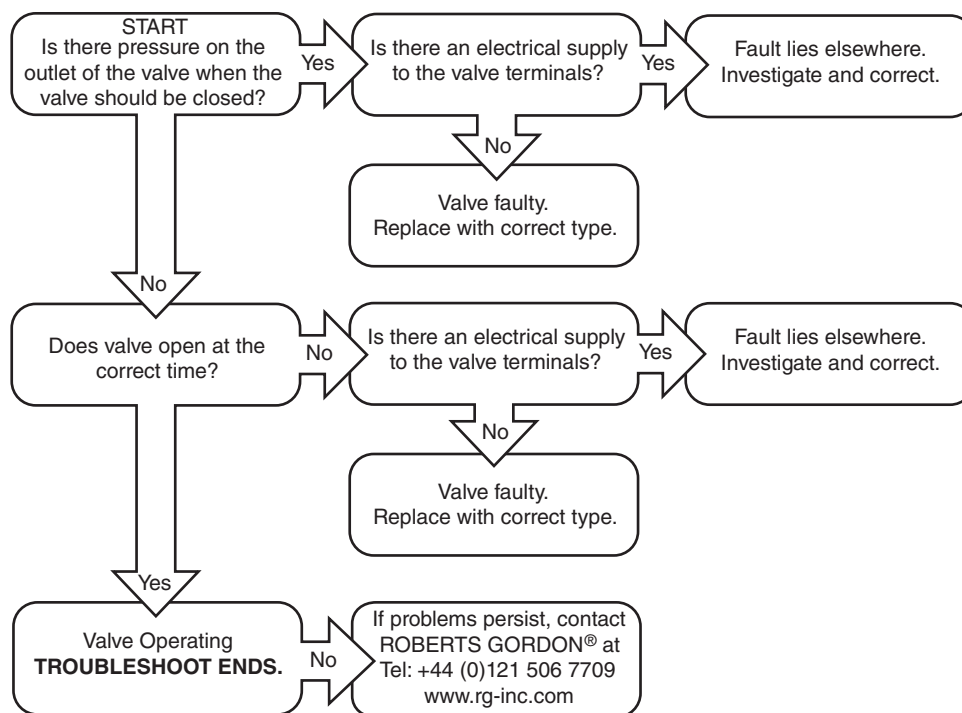
14.4 Troubleshooting for Flame Supervision System

The flame supervision system is different for gas-fired and oil-fired heaters but may be tested in a similar way.  
Gas-fired heaters use a rectification flame probe to monitor the flame.  
Oil-fired heaters use a photo sensitive cell to monitor the flame.  
To connect a suitable meter into the circuit to monitor the flame signal current, disconnect one of the wires to the monitor (there is only one for gas-fired).  
Connect a suitable DC ammeter between the terminal just disconnected and the wire taken from it.  
Should the meter read backwards, then reverse its connections.  
Readings should be approximately as follows(For further details see burner manufacturer's instructions):

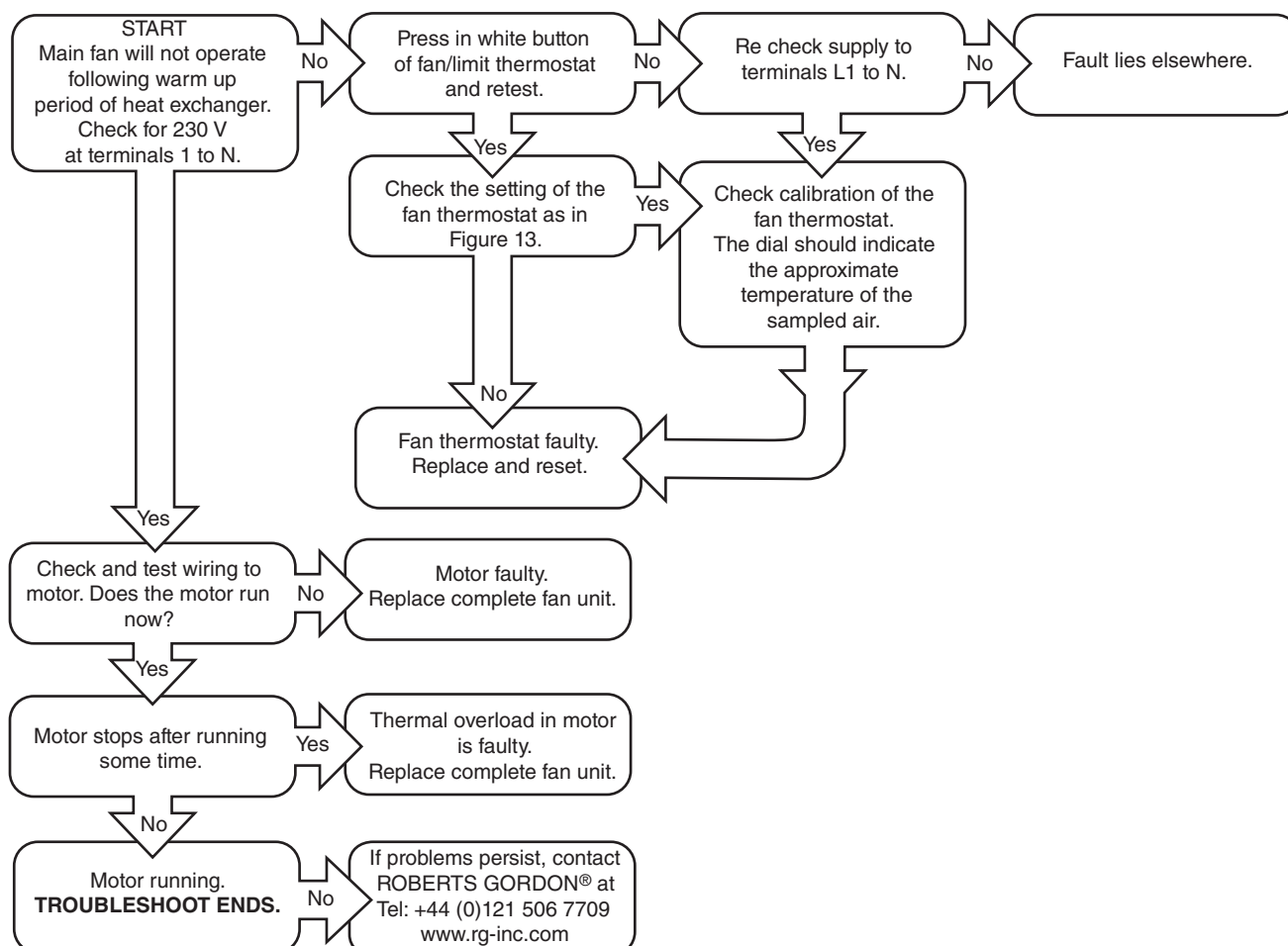
Oil-Fired		Gas-Fired	
Maximum flame current with no flame	Minimum flame current with flame	Maximum flame current with no flame	Minimum flame current with flame
12 µ Amp	25 µ Amp	0.5 µ Amp	1.0 µ Amp



## 14.5 Troubleshooting for Solenoid Valves Circuit

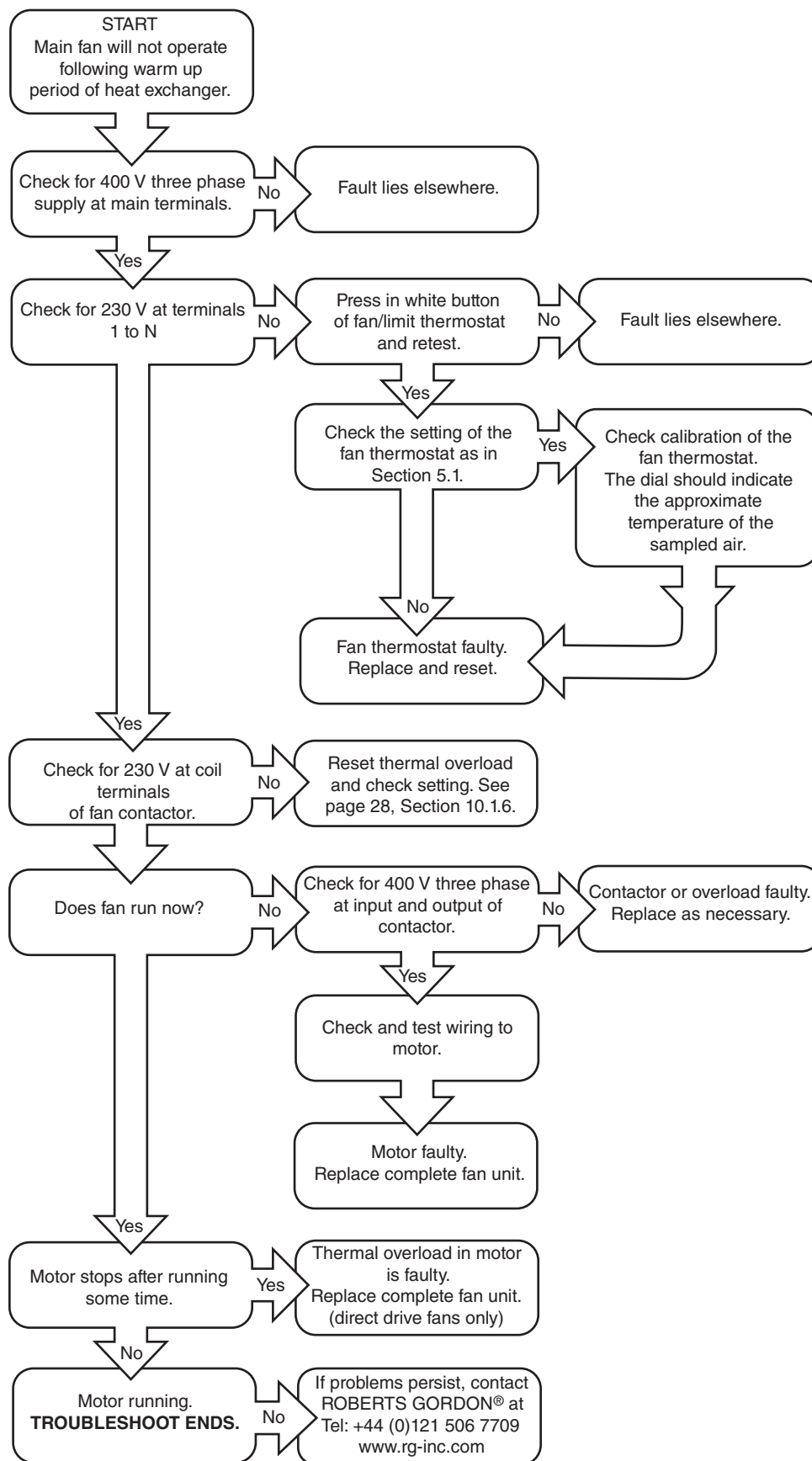


## 14.6 Troubleshooting for Main Fan Circuit (1 Ø)







Conduct Commissioning procedure as shown on Page 40, Section 10.

## 14.7 Troubleshooting for Main Fan (3 Ø)





For your safety and optimum heater performance, use only ROBERTS GORDON® replacement parts.  
**Conduct Commissioning procedure as on Page 40, Section 10.**

## SECTION 15: REMOVAL AND REPLACEMENT PARTS

<b>⚠ DANGER</b>		<b>⚠ WARNING</b>	
			
<b>Electrical Shock Hazard</b>	<b>Explosion Hazard</b>	<b>Fire Hazard</b>	<b>Carbon Monoxide Hazard</b>

**Use only genuine ROBERTS GORDON® replacement parts per this installation, operation and service manual.**

**Failure to follow these instructions can result in death, electric shock, injury or property damage.**

<b>⚠ WARNING</b>  <b>Severe Injury Hazard</b> <b>Use proper lifting practices and equipment.</b> <b>Equipment and accessories are heavy.</b> <b>Failure to follow these instructions can result in death, injury or property damage.</b>	<b>⚠ WARNING</b>  <b>Cut/Pinch Hazard</b> <b>Wear protective gear during installation, operation and service.</b> <b>Edges are sharp.</b> <b>Failure to follow these instructions can result in injury.</b>
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See warnings and important information before removing or replacing parts.  
 After any maintenance or repair work, always test fire the heater in accordance with the commissioning instructions *on Page 40, Section 10* to help ensure all safety systems are in working order before leaving the heater to operate. Minor faults may be traced by using the troubleshooting charts *on Page 58, Section 14.2* through *on Page 62, Section 14.7*.

### 15.1 Burner Components

To remove the burner from the heater:

1. Unplug the burner electrical supply from the heater.
2. Isolate the fuel supply at the inlet manual valve and disconnect the inlet fuel pipe.
3. Unscrew the nuts holding the burner mounting flange to the heater.
4. Remove the burner from the heater, retaining the gasket for reuse.

For removal of burner components, follow the burner manufacturer's instructions. To refit the burner, reverse the instructions above. Fit the gasket between the burner mounting flange and the heater. Use a new gasket, if necessary.

### 15.2 Direct On-Line Main Fan Starter and Thermal Overload Unit (3 Ø)

This assembly comprises two parts, the contactor and the overloads, which may be changed separately.

#### 15.2.1 The Contactor

To remove the contactor:

1. Remove the overloads as *on Page 63, Section 15.2.2*.
2. Remove the line connections to the top of the contactor (noting the colour code) and the two coil connections at the top rear of the contactor.
3. Unscrew the fixing screws to remove the contactor from the panel.
4. Reverse these instructions to refit. Check rotation of the fan after working on the contactor.

#### 15.2.2 The Overloads (models 060 to 100)

To remove the overloads:

1. Unscrew the motor connecting wires from their terminals at the bottom of the assembly. Note the colour code.
2. Disconnect the overload circuit connections near the overload reset button.

3. Disconnect the overload fixing and connecting screws from the bottom of the contactor.
4. Ensure that any replacement overload is of the correct rating and that it is reset correctly. See *Page 41, Section 10.1.6*.

### 15.3 Control Circuit Protection

The control circuit only is protected by a 10 Amp re-settable circuit breaker and does not disconnect the mains electrical supply to this appliance.

**NOTE: In off position, the circuit breaker will still have live electrical components exposed.**

### 15.4 Combination Fan/Limit Thermostat

To gain access to the thermostat:

1. Loosen the cover retaining screw (on top) and remove cover.
2. Disconnect the electrical connections by pushing in with a small screwdriver and pulling out the wiring. See *Page 65, Figure 24*.
3. Unscrew the conduit bush and the two screws and withdraw the unit from the cabinet.
4. Reverse these instructions to refit. See *Page 41, Figure 17* to set the new thermostat.

### 15.5 Main Fan Motor (3 Ø Belt Drive)

1. Disconnect electrical connections at contactor and overloads. See *Page 63, Section 15.2*.
2. For Star/Delta starters, there are six wires between the motor and the starter.
3. Remove the left lower side panel to access the motor.
4. Unscrew the bolts securing the motor to the mounting bracket. Lift the motor out.
5. Reverse these instructions to refit, tensioning the belts as on *Page 52, Figure 23* and ensuring the pulleys are aligned.
6. For Star/Delta starters, pay specific attention to the six motor connections.

### 15.6 Main Fan Units

Depending on the model of the heater, the main fan unit will be direct drive (with integral motor) or belt drive. Models 060-100 are belt drive, double fan units. All the fans are secured to the base of the heater by four bolts per fan case, and to the fan tray by bolts through the outlet flange.

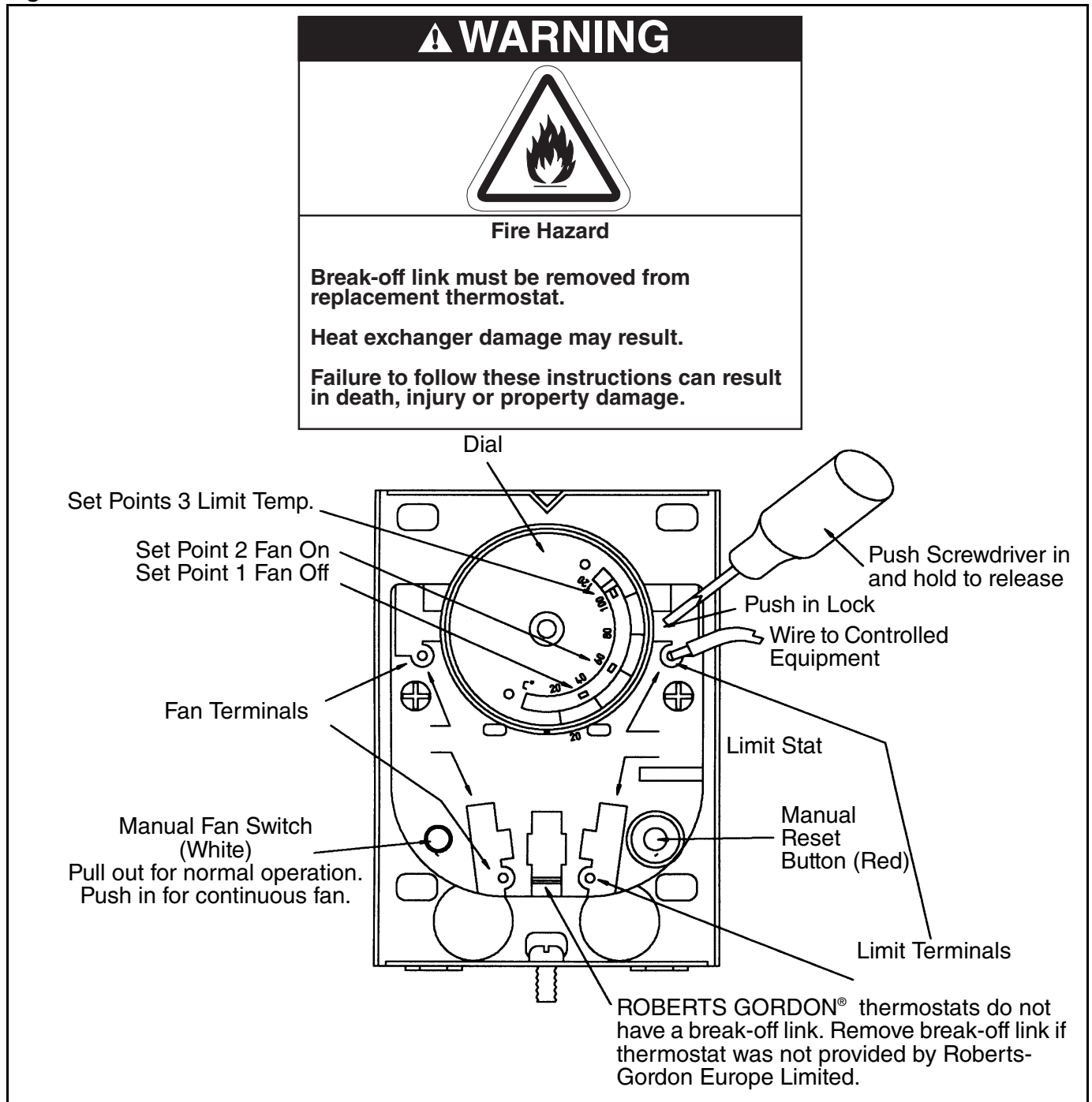
To gain access to the fans:

1. Remove the lower side panels of the heater.  
For models 060-100 and High Flow models, remove the upper side panels of the same side and the vertical centre bar to allow the fans to slide out of the cabinet.
2. Disconnect the electrical connections. On direct drive units, these will be at the terminal

block for single phase and at the contactor for three phase.

3. Remove the screws. The fan will pull out of the heater through the side.
4. Reverse these instructions to refit, tensioning the belts as on *Page 52, Figure 23*.
5. Check the correct rotation of the fan as on *Page 41, Section 10.1.5*.

**NOTE:** The direct drive fan unit motor can only be replaced as a complete fan/motor assembly.

**Figure 24: Combination Fan/Limit Thermostat Parts List**

**SECTION 16: SPARE PARTS LIST****16.1 Gas On/Off****Model: 15 (Gas on/off)****Burner: MAX70**

DESCRIPTION		RG P/N
AIR INTAKE		90768008
ROD	TC	90768001
ROD	TL	90768002
BLAST TUBE	TC	90768003
BLAST TUBE	TL	90768004
CARTER	TC	90762010
FAN SCOOP		90768016
DIFFUSER		90768009
IONIZATION PROBE		90768010
GASKET		90768017
O'RING		90768006
GASKET		92768001
SUPPORT PIPE	TL	91268002
FIRING HEAD		90768005
HEAD CAP		90768011
FAN		90768018
CAPACITOR	3UF AEG	91368007
INNER ASSEMBLY	G20/25	90768020
MOTOR	75W	90668001
AIR PRESSURE SWITCH		90768023
IGNITION TRANSFORMER	052F4040	91368008
GAS PRESSURE SWITCH		91358013
INNER ASSY	G30/31	90768012
CAPACITOR	5UF SIMEL	91368002
NOZZLE	G20-25	90768013
NOZZLE	G30-31	90768014
NEEDLE SPARK		91368003
IGNITION ELECTRODE		91368004
SUPPORT		90768019
BURNER COVER		90768015
CONTROL BOX	THERMOWAT E-BCU	90368001
IONIZATION CABLE	TC	91368005
IONIZATION CABLE	TL	91368006
AIR INTAKE SET (2 PIECE)	DANFOSS	90753010



**Models: 20 and 30 (Gas on/off)****Burner: MAX105**

DESCRIPTION		RG P/N
AIR INTAKE		90768008
ROD	TC	90753003
ROD	TL	90753004
BLAST TUBE	TC	90753005
CARTER	TC	90762010
FAN SCOOP		90768016
DIFFUSER		90768009
IONIZATION PROBE		90768010
GASKET		90768017
O'RING		90768006
GASKET		92768001
SUPPORT PIPE	TC	91253001
FIRING HEAD		90768005
HEAD CAP		90768011
FAN		90768018
CAPACITOR	3UF AEG	91368007
INNER ASSEMBLY	G20/25	90768020
MOTOR	75W	90668001
AIR PRESSURE SWITCH		90768023
IGNITION TRANSFORMER	052F4040	91368008
GAS PRESSURE SWITCH		91358013
INNER ASSY	G30/31	90768012
CAPACITOR	5UF SIMEL	91368002
NOZZLE	G20-25	90768013
NOZZLE	G30-31	90768014
NEEDLE SPARK		91368003
IGNITION ELECTRODE		91368004
SUPPORT		90768019
BURNER COVER		90768015
CONTROL BOX	THERMOWAT E-BCU	90368001
IONIZATION CABLE	TC	91368005
IONIZATION CABLE	TL	91368006
IONIZATION CABLE	TL	91353002
AIR INTAKE SET (2 PIECE)	DANFOSS	90753010

**Models: 40 and 50 (Gas on/off)****Burner: MAX170**

DESCRIPTION		RG P/N
GAS TRAIN MB-ZRDLE 407	170/250	90754015
CONTROL BOX BASE	LANDIS	90353002
AIR INTAKE		90761001
WAISTBAND ROD	TC	90752010
BLAST TUBE	TC	90754003
BURNER COVER		90754005
PROTECTION BOX		90753011
DIFFUSER		90754006
FLANGE		90754014
O'RING		90768006
GASKET		92754001
HOLDER		90754007
SUPPORT PIPE	TC	91254001
FIRING HEAD		90754008
HEAD CAP		90754009
TOOTH	G20-25	90754010
TOOTH	G30-31	90754011
CAPACITOR	3UF AEG	91368007
IONIZATION CABLE	TC	91354001
PLUG WIELAND	4 PIN	91353006
PLUG WIELAND	4 PIN	91353007
INNER ASSEMBLY	G20/25	90754012
MOTOR	200W	90654001
AIR PRESSURE SWITCH		90768023
ANTIJAMMING FILTER		90752015
IGNITION TRANSFORMER	052F4040	91368008
GAS PRESSURE SWITCH		91358013
INNER ASSY	G30/31	90754013
IONIZATION PROBE		91354002
IGNITION ELECTRODE		91354003
CONTROL BOX	THERMOWAT E-BCU	90368001
AIR INTAKE SET (2 PIECE)	DANFOSS	90753010
AIR INTAKE SET (2 PIECE)		90768021

**Models: 60 and 70 (Gas on/off)****Burner: MAX250**

DESCRIPTION		RG P/N
GAS TRAIN MB-ZRDLE 410	170/250	90754016
CONTROL BOX BASE	LANDIS	90353002
AIR INTAKE		90761001
WAISTBAND ROD	TC	90752010
BLAST TUBE	TC	90754003
BURNER COVER		90754005
PROTECTION BOX		90753011
DIFFUSER		90754006
FLANGE		90754014
O'RING		90768006
GASKET		92754001
SUPPORT PIPE	TC	91254001
FIRING HEAD		90754008
HEAD CAP		90754009
TOOTH	G20-25	90754010
TOOTH	G30-31	90754011
CAPACITOR	3UF AEG	91368007
IONIZATION CABLE	TC	91354001
PLUG WIELAND	4 PIN	91353006
PLUG WIELAND	4 PIN	91353007
INNER ASSEMBLY	G20/25	90754012
MOTOR	200W	90654001
AIR PRESSURE SWITCH		90768023
ANTIJAMMING FILTER		90752015
IGNITION TRANSFORMER	052F4040	91368008
GAS PRESSURE SWITCH		91358013
INNER ASSY	G30/31	90754013
IONIZATION PROBE		91354002
IGNITION ELECTRODE		91354003
CONTROL BOX	THERMOWAT E-BCU	90368001
AIR INTAKE SET (2 PIECE)		90768021

**Models: 80 and 100 (Gas on/off)****Burner: MAX350**

DESCRIPTION		RG P/N
GAS TRAIN	MBDLE 412 - 350/500	90758001
CONTROL BOX BASE	LANDIS	90353002
IGNITION CABLE	TC	91358001
IONIZATION CABLE	TC	91358002
IONIZATION CABLE	TL	91358003
IONIZATION PROBE		91358004
CAPACITOR	3UF AEG	91368007
PRESSURE PORT		90758002
ANTI JAMMING FILTER	TL	90753012
IGNITION TRANSFORMER	052F4040	91368008
CONTROL BOX	LME22.331	90358001
SUPPORT PIPE	TL	91358006
CONTROL BOX	LME21.330	90358002
AIR DAMPER MOTOR		90658001
IGNITION ELECTRODE		91358006
AIR PRESSURE SWITCH		91358007
HEAD CAP		90758003
PRESSURE PORT SUPPORT		90758004
ROD	TC	90758005
ROD	TL	90758006
FIRING HEAD		90758007
GAS PRESSURE SWITCH		91358013
MOTOR	SIMEL 300W	90658002
ORING		90758008
HEAD SUPPORT PIPE ELBOW		91258001
AIR INTAKE		90758009
BLAST TUBE	TC	90758010
BLAST TUBE	TL	90758011
DISC		90758012
HEAD SUPPORT PIPE	TC	91258002
HEAD SUPPORT PIPE	TL	91258003
DIFFUSER	G20-25	90758013
DIFFUSER	G31	90758014
NOZZLE GROUP	G20-25	90758015
NOZZLE GROUP	G31	90758016
AIR INTAKE SET (2 PIECE)		90758017
INNER ASSY	G20-25	90758018
INNER ASSY	G31	90758019

**16.2 Gas High/Low****Models: 20 and 30 (Gas high/low)****Burner: MAX120**

DESCRIPTION		RG P/N
AIR DAMPER MOTOR	LANDIS SQN75.224A21	90653001
CONTROL BOX BASE	LANDIS	90353002
ROD	TC	90753003
ROD	TL	90753004
BLAST TUBE	TC	90753007
BURNER COVER	SUNTEC	90753009
FAN SCOOP		90768016
PROTECTION BOX		90753011
DIFFUSER		90768009
IONIZATION PROBE		90768010
GASKET		90768017
O'RING		90768006
GASKET		92768001
SUPPORT PIPE	TC	91253001
FIRING HEAD		90768005
HEAD CAP		90768011
FAN		90768018
CAPACITOR	3UF AEG	91368007
IONIZATION CABLE	TC	91354001
PLUG WIELAND	4 PIN	91353006
PLUG WIELAND	4 PIN	91353007
INNER ASSEMBLY	G20/25	90768020
MOTOR	75W	90668001
AIR PRESSURE SWITCH		90768023
ANTI JAMMING FILTER	TL	90753012
IGNITION TRANSFORMER	052F4040	91368008
SUPPORT PIPE	TC	91253003
GAS PRESSURE SWITCH		91358013
INNER ASSY	G30/31	90768012
AIR INTAKE		90753002
CAPACITOR	5UF SIMEL	91368002
NOZZLE	G20-25	90768013
NOZZLE	G30-31	90768014
NEEDLE SPARK		91368003
IGNITION ELECTRODE		91368004
AIR INTAKE SET (2 PIECE)	DANFOSS	90753010
AIR INTAKE SET (2 PIECE)		90768021

**Models: 40 and 50 (Gas high/low)****Burner: MAX170**

DESCRIPTION		RG P/N
GAS TRAIN MB-ZRDLE 407	170/250	90754015
CONTROL BOX BASE	LANDIS	90353002
AIR INTAKE		90761001
WAISTBAND ROD	TC	90752010
BLAST TUBE	TC	90754003
BURNER COVER		90754005
PROTECTION BOX		90753011
DIFFUSER		90754006
FLANGE		90754014
O'RING		90768006
GASKET		92754001
HOLDER		90754007
SUPPORT PIPE	TC	91254001
FIRING HEAD		90754008
HEAD CAP		90754009
TOOTH	G20-25	90754010
TOOTH	G30-31	90754011
CAPACITOR	3UF AEG	91368007
IONIZATION CABLE	TC	91354001
PLUG WIELAND	4 PIN	91353006
PLUG WIELAND	4 PIN	91353007
INNER ASSEMBLY	G20/25	90754012
MOTOR	200W	90654001
AIR PRESSURE SWITCH		90768023
ANTIJAMMING FILTER		90752015
IGNITION TRANSFORMER	052F4040	91368008
GAS PRESSURE SWITCH		91358013
INNER ASSY	G30/31	90754013
IONIZATION PROBE		91354002
IGNITION ELECTRODE		91354003
CONTROL BOX	THERMOWAT E-BCU	90354001
AIR INTAKE SET (2 PIECE)	DANFOSS	90753010
AIR INTAKE SET (2 PIECE)		90768021

**Models: 60 and 70 (Gas high/low)****Burner: MAX250**

DESCRIPTION		RG P/N
GAS TRAIN MB-ZRDLE 410	170/250	90754016
CONTROL BOX BASE	LANDIS	90353002
AIR INTAKE		90761001
WAISTBAND ROD	TL	90752011
BLAST TUBE	TL	90754004
BURNER COVER		90754005
PROTECTION BOX		90753011
DIFFUSER		90754006
IGNITION CABLE	TL	91354006
FLANGE		90754014
O'RING		90768006
GASKET		92754001
SUPPORT PIPE	TL	91254002
FIRING HEAD		90754008
HEAD CAP		90754009
TOOTH	G20-25	90754010
TOOTH	G30-31	90754011
CAPACITOR	3UF AEG	91368007
IONIZATION CABLE	TL	91353005
PLUG WIELAND	4 PIN	91353006
PLUG WIELAND	4 PIN	91353007
INNER ASSEMBLY	G20/25	90754012
MOTOR	200W	90654001
AIR PRESSURE SWITCH		90768023
ANTIJAMMING FILTER		90752015
IGNITION TRANSFORMER	052F4040	91368008
GAS PRESSURE SWITCH		91358013
INNER ASSY	G30/31	90754013
IONIZATION PROBE		91354002
IGNITION ELECTRODE		91354003
CONTROL BOX	THERMOWAT E-BCU	90354001
AIR INTAKE SET (2 PIECE)		90768021

**Models: 80 and 100 (Gas high/low)****Burner: MAX350****Burner Head: TC/TL**

DESCRIPTION		RG P/N
GAS TRAIN	MBDL 412 - 350/500	90758001
CONTROL BOX BASE	LANDIS	90353002
IGNITION CABLE	TC	91358001
IONIZATION CABLE	TC	91358002
IONIZATION CABLE	TL	91358003
IONIZATION PROBE		91358004
CAPACITOR	3UF AEG	91368007
PRESSURE PORT		90758002
ANTI JAMMING FILTER	TL	90753012
IGNITION TRANSFORMER	052F4040	91368008
CONTROL BOX	LME22.331	90358001
SUPPORT PIPE	TL	91358006
CONTROL BOX	LME21.330	90358002
AIR DAMPER MOTOR		90658001
IGNITION ELECTRODE		91358006
AIR PRESSURE SWITCH		91358007
HEAD CAP		90758003
PRESSURE PORT SUPPORT		90758004
ROD	TC	90758005
ROD	TL	90758006
FIRING HEAD		90758007
GAS PRESSURE SWITCH		91358013
MOTOR	SIMEL 300W	90658002
ORING		90758008
HEAD SUPPORT PIPE ELBOW		91258001
AIR INTAKE		90758009
BLAST TUBE	TC	90758010
BLAST TUBE	TL	90758011
DISC		90758012
HEAD SUPPORT PIPE	TC	91258002
HEAD SUPPORT PIPE	TL	91258003
DIFFUSER	G20-25	90758013
DIFFUSER	G31	90758014
NOZZLE GROUP	G20-25	90758015
NOZZLE GROUP	G31	90758016
AIR INTAKE SET (2 PIECE)		90758017
INNER ASSY	G20-25	90758018
INNER ASSY	G31	90758019



**16.3 Oil On/Off****Models: 15 and 20 (Oil on/off)****Burner: MAX8**

DESCRIPTION		RG P/N
COVER AIR INLET		90762009
BLAST TUBE	TC	90762004
BLAST TUBE	TL	90762005
CARTER	TC	90762010
FAN SCOOP		90768016
NOZZLE HOLDER SUPPORT		90762011
ROD	TC	90762002
NOZZLE HOLDER		90762015
SNORKEL		90762001
DIFFUSER		90762006
ELECTRODES		91362004
GASKET		90768017
O'RING		90768006
PIPE GASKET		92762001
GASKET		92768001
PIPE		91262001
FAN		90768018
CAPACITOR	4UF AEG	91362002
PLUG WIELAND	7	91368009
SOCKET WIELAND		91368010
FIRING HEAD	TC	90762007
FIRING HEAD	TL	90762008
COUPLING		90762016
HOSES		90762017
IGN TRANSFORMER		91362005
OIL VALVE	SUNTEC	90762021
COIL	SUNTEC	91362006
COIL	DANFOSS	90762018
MOTOR	100W	90662001
CAPACITOR	6.3UF SIMEL	91354004
OIL PUMP		90762012
FILTER	ART.70301-01P	90762019
SUPPORT		90768019
IGNITION CABLE	TC	91962001
IGNITION CABLE	TL	91353003
COVER		90762013
CONTROL BOX	THERMOWAT E-BCU	90362001

**Models: 30 (Oil on/off)****Burner: MAX12**

DESCRIPTION		RG P/N
COVER AIR INLET		90762009
ROD	TC	90764001
ROD	TL	90764002
BLAST TUBE	TC	90764003
BLAST TUBE	TL	90764004
GRATE		90764005
AIR DAMPER		90764006
FAN SCOOP		90768016
PROTECTION BOX		90753011
NOZZLE HOLDER SUPPORT		90762011
NOZZLE HOLDER		90762015
REAR DISC		90764007
DIFFUSER		90764008
ELECTRODES		91362004
CABLES	TC	91964001
CABLES	TL	91353004
GASKET		90768017
O'RING		90768006
PIPE GASKET		92762001
GASKET		92768001
NIPPLE	TN 6 X 700	90764009
PIPE		91262001
PIPE HYDRAULIC SYSTEM		98064010
FAN		90768018
CAPACITOR	3UF AEG	91368007
PLUG WIELAND	4 PIN	91353006
PLUG WIELAND	4 PIN	91353007
PLUG WIELAND	7	91368009
SOCKET WIELAND		91368010
WIRING TERMINAL BOX		91364001
HYDRAULIC SYSTEM		98064020
FIRING HEAD	TC	90764010
FIRING HEAD	TL	90764011
MOTOR	130W	90663001
COUPLING		90762016
HOSES	NW 6 X 700	90764012
HOSES		90762017
IGN TRANSFORMER		91362005
OIL VALVE	SUNTEC	90762021
COIL	SUNTEC	91362006
COIL	DANFOSS	90762018
FILTER	ART.70301-01P	90761008
COVER AIR INLET		90764013
IGN TRANSFORMER	FIDA MOD.26/30	91364002
CAPACITOR	6.3UF SIMEL	91354004
OIL PUMP		90762012
FILTER	ART.70301-01P	90762019
OIL PUMP	SUNTEC	90764015
SUPPORT		90768019
IGNITION CABLE	TC	91962001
IGNITION CABLE	TL	91353003

COVER		90762013
CONTROL BOX	THERMOWAT E-BCU	90362001

**Models: 40 and 50 (Oil on/off)**

**Burner: MAX15:**

DESCRIPTION		RG P/N
ROD	TC	90752008
ROD	TL	90752009
WAISTBAND ROD	TC	90752010
WAISTBAND ROD	TL	90752011
WAISTBAND		90752001
BLAST TUBE	TC	90752002
BLAST TUBE	TL	90752003
GRATE		90764005
COVER		90752012
PROTECTION BOX		90753011
NOZZLE HOLDER SUPPORT		90752004
NOZZLE HOLDER		90762015
DIFFUSER		90752005
ELECTRODES		91362004
CABLES	TC	91952001
IGNITION CABLE	TC	91354005
FLANGE		90752006
O'RING		90768006
PIPE GASKET		92762001
GASKET		92752001
AIR DAMPER		90752013
PIPE		91252001
CAPACITOR	3UF AEG	91368007
PLUG WIELAND	4 PIN	91353006
PLUG WIELAND	4 PIN	91353007
PLUG WIELAND	7	91368009
SOCKET WIELAND		91368010
HYDRAULIC SYSTEM		98052001
MOTOR	130W	90663001
COUPLING		90762016
OIL PUMP	DANFOSS	90752014
ANTIJAMMING FILTER		90752015
HOSES		90762017
IGN TRANSFORMER		91362005
OIL VALVE	SUNTEC	90762021
OIL VALVE	DANFOSS	90762022
COIL	SUNTEC	91362006
COIL	DANFOSS	90762018
FAN	160 X 52	90752007
PIPE GASKET		92752002
CAPACITOR	6.3UF SIMEL	91354004
FILTER	ART.70301-01P	90762019
OIL PUMP	SUNTEC	90752016
OIL PUMP	SUNTEC	90764015
CONTROL BOX	THERMOWAT E-BCU	90362001
CABLES	TC	91368001
CABLES	TL	91952002
COVER		90752017

**Models: 60 and 70 (Oil on/off)****Burner: MAX20**

DESCRIPTION		RG P/N
ROD	TC	90752008
ROD	TL	90752009
WAISTBAND ROD	TC	90752010
WAISTBAND ROD	TL	90752011
WAISTBAND		90751001
BLAST TUBE	TC	90751002
BLAST TUBE	TL	90751003
GRATE		90764005
NOZZLE HOLDER SUPPORT		90751004
NOZZLE HOLDER		90762015
DIFFUSER		90766001
ELECTRODES		91362004
CABLES	TC	91952001
IGNITION CABLE	TC	91354005
FLANGE		90754014
O'RING		90768006
PIPE GASKET		92762001
GASKET		92754001
AIR DAMPER		90752013
PIPE		91252001
CAPACITOR	6 UF AEG	91351001
PLUG WIELAND	7	91368009
SOCKET WIELAND		91368010
MOTOR	200W	90663002
COUPLING		90762016
OIL PUMP	DANFOSS	90752014
HOSES		90762017
IGN TRANSFORMER		91362005
OIL VALVE	SUNTEC	90762021
OIL VALVE	DANFOSS	90762022
COIL	SUNTEC	91362006
COIL	DANFOSS	90762018
FAN	160 X 62	90754100
FILTER	ART.70301-01P	90762019
OIL PUMP	SUNTEC	90752016
SUPPORT		90768019
CONTROL BOX	THERMOWAT E-BCU	90362001
CABLES	TC	91368001
CABLES	TL	91952002
COVER		90752017

**Models: 80 (Oil on/off)****Burner: MAX30**

DESCRIPTION		RG P/N
ROD	TC	90752008
ROD	TL	90752009
WAISTBAND ROD	TC	90752010
WAISTBAND ROD	TL	90752011
WAISTBAND		90751001
BLAST TUBE	TC	90751002
BLAST TUBE	TL	90751003
GRATE		90764005
NOZZLE HOLDER SUPPORT		90751004
NOZZLE HOLDER		90762015
DIFFUSER		90767001
ELECTRODES		91362004
FLANGE		90754014
O'RING		90768006
PIPE GASKET		92762001
GASKET		92754001
AIR DAMPER		90752013
PIPE		91252001
CAPACITOR	6 UF AEG	91351001
PLUG WIELAND	7	91368009
SOCKET WIELAND		91368010
MOTOR	200W	90663002
COUPLING		90762016
OIL PUMP	DANFOSS	90752014
HOSES		90762017
IGN TRANSFORMER		91362005
OIL VALVE	SUNTEC	90762021
OIL VALVE	DANFOSS	90762022
COIL	SUNTEC	91362006
COIL	DANFOSS	90762018
FAN	160 X 62	90754100
FILTER	ART.70301-01P	90762019
OIL PUMP	SUNTEC	90752016
SUPPORT		90768019
CONTROL BOX	THERMOWAT E-BCU	90362001
CABLES	TC	91368001
CABLES	TL	91952002
COVER		90752017

**Models: 100 (Oil on/off)****Burner: MAX35**

DESCRIPTION		RG P/N
ELECTRODES		91361001
CAPACITOR	14 UF	91361002
HYDRAULIC SYSTEM		98052001
COUPLING	SIMEL	90761004
OIL PUMP	SUNTEC AS67B	90761005
ANTIJAMMING FILTER	TL	90753012
HOSES	TN 10X1200	90761006
IGN TRANSFORMER		91362005
OIL VALVE	SUNTEC	90762021
COIL	SUNTEC	91362006
COIL		90751006
FUSE SUPPORT		91358011
LAMP		91358008
MAIN SWITCH	120 X 50	91358009
HIGH-LOW FLAME SWITCH		91358010
GASKET		92758001
BURNER COVER		90758020
COVER		90758021
FAN	180 X 80	90758022
NOZZLE HOLDER SUPPORT		90761009
ROD	TC	90761010
ROD	TL	90761011
CABLES	TC	91961001
MOTOR	370W	90661001
BLAST TUBE	TC	90761012
BLAST TUBE	TL	90761013
NOZZLE HOLDER SUPPORT		90761014
DIFFUSER		90761015
COVER AIR INLET		90761016
PIPE (2ND FLAME)		91261001
PIPE HYDRAULIC SYSTEM		91261002
PUMP PIPE		91261003
FIRING HEAD HOSES	TC	90761017
FIRING HEAD HOSES	TL	90761018

**16.4 Oil High/Low****Models: 30 (Oil high/low)****Burner: MAX12**

DESCRIPTION		RG P/N
COVER AIR INLET		90762009
ROD	TC	90764001
ROD	TL	90764002
BLAST TUBE	TC	90764003
BLAST TUBE	TL	90764004
GRATE		90764005
AIR DAMPER		90764006
FAN SCOOP		90768016
PROTECTION BOX		90753011
NOZZLE HOLDER SUPPORT		90762011
NOZZLE HOLDER		90762015
REAR DISC		90764007
DIFFUSER		90764008
ELECTRODES		91362004
CABLES	TC	91964001
CABLES	TL	91353004
GASKET		90768017
O'RING		90768006
PIPE GASKET		92762001
GASKET		92768001
NIPPLE	TN 6 X 700	90764009
PIPE		91262001
PIPE HYDRAULIC SYSTEM		98064010
FAN		90768018
CAPACITOR	3UF AEG	91368007
PLUG WIELAND	4 PIN	91353006
PLUG WIELAND	4 PIN	91353007
PLUG WIELAND	7	91368009
SOCKET WIELAND		91368010
WIRING TERMINAL BOX		91364001
HYDRAULIC SYSTEM		98064020
FIRING HEAD	TC	90764010
FIRING HEAD	TL	90764011
MOTOR	130W	90663001
COUPLING		90762016
HOSES	NW 6 X 700	90764012
HOSES		90762017
IGN TRANSFORMER		91362005
OIL VALVE	SUNTEC	90762021
COIL	SUNTEC	91362006
COIL	DANFOSS	90762018
FILTER	ART.70301-01P	90761008
COVER AIR INLET		90764013
IGN TRANSFORMER	FIDA MOD.26/30	91364002
CAPACITOR	6.3UF SIMEL	91354004
OIL PUMP		90762012
FILTER	ART.70301-01P	90762019
OIL PUMP	SUNTEC	90764015
SUPPORT		90768019
IGNITION CABLE	TC	91962001

IGNITION CABLE	TL	91353003
COVER		90762013
CONTROL BOX	THERMOWAT E-BCU	90362001

**Models: 40 and 50 (Oil high/low)****Burner: MAX15**

DESCRIPTION		RG P/N
ROD	TC	90752008
ROD	TL	90752009
WAISTBAND ROD	TC	90752010
WAISTBAND ROD	TL	90752011
WAISTBAND		90752001
BLAST TUBE	TC	90752002
BLAST TUBE	TL	90752003
GRATE		90764005
COVER		90752012
PROTECTION BOX		90753011
NOZZLE HOLDER SUPPORT		90752004
NOZZLE HOLDER		90762015
DIFFUSER		90752005
ELECTRODES		91362004
CABLES	TC	91952001
IGNITION CABLE	TC	91354005
FLANGE		90752006
O'RING		90768006
PIPE GASKET		92762001
GASKET		92752001
AIR DAMPER		90752013
PIPE		91252001
CAPACITOR	3UF AEG	91368007
PLUG WIELAND	4 PIN	91353006
PLUG WIELAND	4 PIN	91353007
PLUG WIELAND	7	91368009
SOCKET WIELAND		91368010
HYDRAULIC SYSTEM		98052001
MOTOR	130W	90663001
COUPLING		90762016
OIL PUMP	DANFOSS	90752014
ANTIJAMMING FILTER		90752015
HOSES		90762017
IGN TRANSFORMER		91362005
OIL VALVE	SUNTEC	90762021
OIL VALVE	DANFOSS	90762022
COIL	SUNTEC	91362006
COIL	DANFOSS	90762018
FAN	160 X 52	90752007
PIPE GASKET		92752002
CAPACITOR	6.3UF SIMEL	91354004
FILTER	ART.70301-01P	90762019
OIL PUMP	SUNTEC	90752016
OIL PUMP	SUNTEC	90764015
CONTROL BOX	THERMOWAT E-BCU	90362001
CABLES	TC	91368001
CABLES	TL	91952002



COVER		90752017
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**Models: 60, 70 and 80 (Oil High/low)**

**Burner: MAX25**

DESCRIPTION		RG P/N
NOZZLE	2.75 X 60B	90751009
ROD	TC	90751011
ROD	TL	90751012
WAISTBAND		90751001
BLAST TUBE	TC	90751002
BLAST TUBE	TL	90751003
GRATE		90764005
COVER		90752012
PROTECTION BOX		90753011
NOZZLE HOLDER SUPPORT		90751013
NOZZLE HOLDER		90762015
DIFFUSER		90751005
ELECTRODES		91362004
FLANGE		90754014
O'RING		90768006
PIPE GASKET		92762001
GASKET		92754001
AIR DAMPER		90752013
PIPE		91251001
CAPACITOR	6 UF AEG	91351001
PLUG WIELAND	4 PIN	91353006
PLUG WIELAND	4 PIN	91353007
PLUG WIELAND	7	91368009
SOCKET WIELAND		91368010
HYDRAULIC SYSTEM		98052001
MOTOR	200W	90663002
COUPLING		90762016
ANTIJAMMING FILTER		90752015
HOSES		90762017
IGN TRANSFORMER		91362005
OIL VALVE		90762020
OIL VALVE	SUNTEC	90762021
COIL	SUNTEC	91362006
COIL		90751006
FAN	160 X 62	90754100
PIPE (2ND FLAME)		91251002
HYDRAULIC SYSTEM PIPE		98051001
PIPE GASKET		92752002
CAPACITOR	6.3UF SIMEL	91354004
FILTER	ART.70301-01P	90762019
OIL PUMP	SUNTEC	90752016

**Models: 100 Oil (high/low)****Burner: MAX35**

DESCRIPTION		RG P/N
ELECTRODES		91361001
CAPACITOR	14 UF	91361002
HYDRAULIC SYSTEM		98052001
COUPLING	SIMEL	90761004
OIL PUMP	SUNTEC AS67B	90761005
ANTIJAMMING FILTER	TL	90753012
HOSES	TN 10X1200	90761006
IGN TRANSFORMER		91362005
OIL VALVE	SUNTEC	90762021
COIL	SUNTEC	91362006
COIL		90751006
FUSE SUPPORT		91358011
LAMP		91358008
MAIN SWITCH	120 X 50	91358009
HIGH-LOW FLAME SWITCH		91358010
GASKET		92758001
BURNER COVER		90758020
COVER		90758021
FAN	180 X 80	90758022
NOZZLE HOLDER SUPPORT		90761009
ROD	TC	90761010
ROD	TL	90761011
CABLES	TC	91961001
MOTOR	370W	90661001
BLAST TUBE	TC	90761012
BLAST TUBE	TL	90761013
NOZZLE HOLDER SUPPORT		90761014
DIFFUSER		90761015
COVER AIR INLET		90761016
PIPE (2ND FLAME)		91261001
PIPE HYDRAULIC SYSTEM		91261002
PUMP PIPE		91261003
FIRING HEAD HOSES	TC	90761017
FIRING HEAD HOSES	TL	90761018



Attach this information to the wall near the ROBERTS GORDON® heater



# ROBERTS GORDON®

Read the Installation, Commissioning, Operation and Service Manual thoroughly before installation, operation or service.

## OPERATING INSTRUCTIONS

1. STOP! Read all safety instructions on this information sheet.
2. Open the manual fuel valve in the heater supply line.
3. Turn on electric power to the heater.
4. Set the thermostat to desired setting (above ambient temperature).

The automatic starting sequence begins.

**NOTE:** Following long shutdown periods, the burner control may go to 'LOCKOUT' during the start sequence. Push the reset button to recommence firing. Contact service department if 'LOCKOUT' continues (see manual for details).

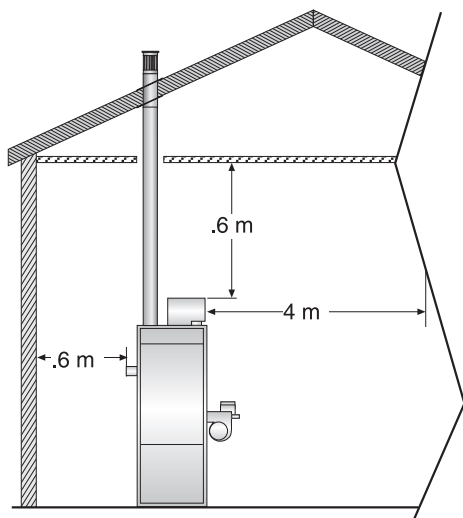
## TO TURN OFF THE HEATER

1. Turn the thermostat/time switch to 'OFF'. The burner will turn off immediately, but fans will continue to cool the heat exchanger until the fan thermostat switches off.

## IF THE HEATER WILL NOT OPERATE, TO ENSURE YOUR SAFETY, FOLLOW THESE INSTRUCTIONS TO SHUT DOWN YOUR HEATER

1. Set the thermostat to 'OFF' or the lowest setting.
2. Turn off electric power to the heater.
3. Turn off the manual fuel valve in the heater supply line.
4. Call your registered installer/contractor qualified in the installation and service of gas or oil-fired heating equipment.

## Installation Clearances



## ⚠ WARNING



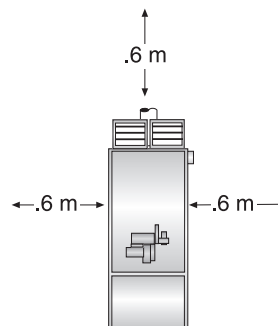
## Fire Hazard

**Some objects can catch fire or explode when placed close to heater.**

**Keep all flammable objects, liquids and vapours the required clearances to combustibles away from heater.**

**Failure to follow these instructions can result in death, injury or property damage.**

## Clearances to Combustibles



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### Installation Code and Annual Inspections:

All installation and service of ROBERTS GORDON® equipment must be performed by a contractor qualified in the installation and service of equipment sold and supplied by Roberts-Gordon and conform to all requirements set forth in the ROBERTS GORDON® manuals and all applicable governmental authorities pertaining to the installation, service and operation of the equipment. To help facilitate optimum performance and safety, Roberts-Gordon recommends that a qualified contractor annually inspect your ROBERTS GORDON® equipment and perform service where necessary, using only replacement parts sold and supplied by Roberts-Gordon.

For installations at elevations above 2000' (610 m), the appliance shall be derated 4% for each 1000' (305 m) of elevation above sea level.

**Further Information:** Applications, engineering and detailed guidance on systems design, installation and equipment performance is available through ROBERTS GORDON® representatives. Please contact us for any further information you may require, including the Installation, Commissioning, Operation and Service Manual.

**This product is not for residential use.**